The REVIEW

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THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

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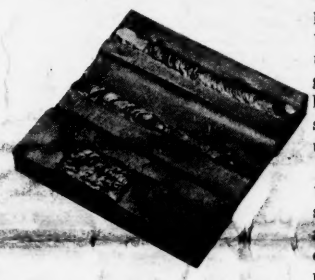
New Welding Rod Facilitates Salvage Of Aluminum Castings

With the welding of aluminum by metallic arc becoming increasingly important, a new electrode for welding aluminum sheet and castings has been developed by Eutectic Welding Alloys Co., 40 Worth St., New York 13, N. Y. This new rod, known as Eutec-Trode 2100, opens a new field for arc welding—namely, the salvage and reclamation of aluminum castings, the company claims.

With this electrode it is possible to add metal without completely preheating the casting, and particularly without danger of overheating the metal adjacent to the weld. Operation is extremely rapid, thus very economical, and renders the salvage of defective castings a simple and inexpensive procedure.

Illustrated are three types of welds made with the new electrode on an aluminum casting. The top weld is a single bead deposit; the center weld shows 2100 used in a "V" groove; and the bottom weld represents a pad built up on a casting.



This rod is said to be extremely successful in the addition of metal on faulty or improperly machined castings, overlaying of surfaces which have been improperly cast, filling of low spots, changing of aluminum patterns already machined, filling of faultily drilled holes, filling and overlaying of porous castings, and welding of castings to aluminum sheet. In the joining of aluminum sheet, the extremely high rate of fusion of this rod produces a smooth, strong, homogeneous fillet with great speed, avoiding distortion.

This rod is a high aluminum and low silicon composition which alloys itself to practically every type of aluminum. It is available in ⅛-in., 5/32-in. and 3/16-in. sizes. Standard package, 25 lb. Prompt delivery.

Mention R278 When Writing or Using Reader Service

See Pages 13, 15, 17 *for More New Products*

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Van Horn and Herty Named ASM Heads

K. R. Van Horn *C. H. Herty, Jr.*

IN ACCORDANCE with the Constitution of the American Society for Metals, the Nominating Committee appointed by President Marcus A. Grossmann met on Friday, May 26, in New York. The Committee consists of A. O. Schaefer, chairman; Joseph A. de Bondy, J. B. Johnson, A. B. Kinzel, W. D. McMillan, W. J. Reagan, and G. C. Riegel. By unanimous action of the Committee the following nominations were made for A. S. M. national officers:

For President (One Year)

KENT R. VAN HORN, Research Metallurgist, Aluminum Co. of America, Cleveland, Ohio.

For Vice-President (One Year)

CHARLES H. HERTY, JR., Assistant to Vice-President, Bethelehem Steel Co., Bethlehem, Pa.

For Secretary (Two Years)

W. H. EISENMAN, National Headquarters, Cleveland, Ohio.

For Trustees (Two Years Each)

LEWIS S. BERGEN, Associate Director of Metallurgy and Research, Crucible Steel Co. of America, New York.

ROBERT W. SCHLUMPF, Metallurgical Engineer, Hughes Tool Co., Houston, Texas.

The Constitution provides that additional nominations may be made prior to July 15 by written communications addressed to the Secretary of the Society and signed by any 50 members. If no such additional nominations are received prior to July 15, nominations shall be closed and the Secretary, at the next annual meeting in the fall, shall cast the unanimous vote of all members for the above candidates.

Jominy Illustrates Various Uses of Hardenability Test

Reported by S. B. Knutson

Chief Metallurgist, Ordnance Management Division
McQuay-Norris Mfg. Co.

Many points of interest for the heat treater, the laboratory analyst, and the quality control and processing engineer were contained in a talk by Walter E. Jominy before the St. Louis Chapter A.S.M. on April 21. Mr. Jominy described his work on hardenability and the well-known test which bears his name.

He illustrated how one could predict the hardness and hardenability of intricate machine parts, with or without the use of the part involved, and how it could be predetermined whether a particular heat or series of heats of steel would meet the necessary requirements after machining.

The Jominy test can be applied to smaller sections than the usual 1-in. standard, and perhaps the hardenability factor, as illustrated in the Jominy test, can be applied to small and thin sections.

An extended series of informal discussions that followed the regular meeting kept Mr. Jominy completely occupied until late in the evening.

Lit Review Annotates 275 Articles on Aluminum, Magnesium

Two hundred and seventy-five references to articles concerning the light metals aluminum and magnesium have been included in the first five issues of The Review of Current Metal Literature, which started publication in THE REVIEW last February. The present June installment alone includes 21 articles on aluminum and 27 on magnesium, as listed in the Materials Index on page 3.

Not only is a widespread interest in the war and post-war uses of the light metals reflected in this wealth of published material, but also an active period of new development and research.

These articles will be found under almost all classifications of the Metal Literature Review—particularly production of the metals, properties, protection, testing, casting, heat treatment, working, machining, welding and industrial uses and applications.

The complete literature reference is given under these classifications with a brief annotation indicating the general content of the article. Since publications on the light metals are thus scattered throughout the entire range of subjects, the Materials Index, which lists the references by the particular metal or alloy concerned, is a valuable addition to the Metal Literature Review. In the Materials Index the articles are designated by section and number without listing title and reference, since it is a simple matter to look up the numbers in the corresponding sections.

Other classifications in the Materials Index are cast iron, cast steel, wrought carbon steel, alloy steel, stainless and heat resisting steel, tool steels and carbides, ferro-alloys, copper, nickel, lead, tin, zinc, miscellaneous minor metals, general ferrous and general non-ferrous subjects. It thus provides a quick, simple, and complete reference file to all articles published on any particular metal or its alloy during the month preceding publication date.

X-Rays Serve as Thickness Gage For Sheet Steel, Coolidge Reveals

A new use of X-rays as a thickness gage was described by William D. Coolidge, vice-president in charge of research for General Electric Co., in his acceptance of the Franklin Medal, awarded by the Franklin Institute.

Thickness of hot sheet steel at temperatures as high as 2000° F. and moving 1750 ft. per min. as it emerges from a rolling mill can be accurately measured, Dr. Coolidge told his audience.

With an X-ray outfit below and an ionization chamber or other X-ray intensity measuring device above the sheet, it is possible through the measurement of X-ray transmission to have a constant indication of thickness and, if desired, to have the X-rays themselves control the mill so as to maintain automatically a constant thickness of the steel sheet.

PASS-A-ROUND

Many executives in your plant will want to see this record of what happened last month in the metal industry. Just fill in the names, note items for special attention—and Pass-A-Round.

Name	Item No.	Check

File or Clip for Future Reference

This is a record of important new developments in the metal industry during the past month—save it!

A.S.M. REVIEW OF CURRENT METAL LITERATURE

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month

1. PRODUCTION OF METALS

1-53. Impact of the War on Nevada Mining and Metallurgical Operations. Joy A. Carpenter. *Mining and Metallurgy*, v. 25, May '44, pp. 251-253.

Mining is the principal industry in Nevada. Of the current developments, the most important, with a likely postwar future, is the $130,000,000 Basic Magnesium enterprise, which, in two days, can produce as much as the entire American annual output 13 years ago.

1-54. Nicaro Nickel's New Cuban Plant Begins Production. *Mining and Metallurgy*, v. 25, May '44, pp. 254-256.

A new source of this metal has been started by the Nicaro Nickel Co., subsidiary of the Freeport Sulphur Co.

1-55. Mineral Composition of the Tin Ores of Renison Bell Tasmania. F. L. Stillwell and A. B. Edwards. Australasian Institute of Mining and Metallurgy *Proceedings*, Nos. 131 and 132, Sept.-Dec. 1943, pp. 173-186.

Mineral composition; non-sulphide gangue minerals; oxidation. 6 ref.

1-56. Hecla's California Project Red Cloud Mines Inc. *Mining World*, v. 6, April '44, pp. 11-13.

Conversion of the Jenny Lind gold concentrator by the Hecla Mining Co., to handle complex zinc-lead ore from the Blue Moon claims, gives California its first major zinc operation in many years.

1-57. Rimming Steel. T. Swinden, W. W. Stevenson, and G. E. Speight. *Metallurgia*, v. 29, March '44, pp. 249-253.

Experimental work on five casts of rimming steel, in the range of pit sample carbon analyses 0.04 to 0.14%. A study has been made of the variations in carbon and oxygen in relation to the balanced composition as modified by the presence of manganese and the effect of pressure. 17 ref.

1-58. Gold and Silver Winning by Amalgamation. Douglas Rennie Hudson. *Metallurgia*, v. 29, March '44, pp. 255-261.

Development of mining, amalgamation extraction, and applications of gold, silver and mercury from prehistoric time.

1-59. Nodulizing Iron Ore. Gilbert E. Seil. *Iron Age*, v. 153, April 27, '44, pp. 40-46.

Nodulizing in rotary kilns has been little used for the preparation of iron ore as compared to sintering. This method has certain advantages over the static process of partial fusion. A comparison of operations and costs and suggestions for improved results from rotary kilns.

1-60. New Caledonian Nickel. W. H. Dennis. *Mine and Quarry Engineering*, v. 9, April '44, pp. 96-97.

Absence of copper, sulphur and precious metals simplifies recovery of metal and renders unnecessary a complicated smelting operation.

1-61. The Metallurgy of Molybdenum. L. G. Whybrow, Palethorpe. *Chemical Age*, v. 50, April 1, '44, pp. 315-317.

Importance in iron and steel alloys. Natural sources, properties and uses of molybdenum, chemical uses, iron and steel industry, types of molybdenum steel.

1-62. The Relation of Open-Hearth Practice to Segregation in Rimmed Steel. J. W. Halley and G. L. Plimpton. *Blast Furnace & Steel Plant*, v. 32, May '44, pp. 539-546, 550.

Segregation in rimmed steel from the standpoint of the mechanisms which produce it and survey of the phases of open-hearth practice which influence those mechanisms.

1-63. Basic Magnesium, Inc. *Western Metals*, v. 2, May '44, pp. 7-12.

The story of America's desert giant.

1-64. The Carbothermic Process of Magnesium Production. *Western Metals*, v. 2, May '44, pp. 36-37, 39.

The carbothermic method employs carbon and heat. Three principal elements in the Permanente operations; The dolomite quarry and calcining plant at Natividad, the sea water treatment tanks at Moss Landing and the reduction plant at Permanente.

1-65. Sponge Iron Has Definite Place in Postwar Picture. Walter A. Janssen. *Steel*, v. 114, May 22, '44, pp. 94, 145-148.

Will be a "must" in making special grades of both carbon and alloy steels since dilution of scrap with alloying elements makes it necessary for steel producers to use more virgin materials. Sponge iron will be made available in tonnages comparable to ferro-alloys.

1-66. Tantalite from Brazil. *Mining Journal*, v. 27, May 15, '44, pp. 5-7.

Military uses for tantalum are military secrets, increasing quantities are being used in the manufacture of certain alloys.

2. PROPERTIES OF METALS

2-22. Will Magnesium Survive the War? Samuel Crowther III. *Western Metals*, v. 2, May '44, pp. 12, 15-16.

Future possibilities of this miracle metal outlined.

2-23. Thermal and Electrical Conductivity of Graphite and Carbon at Low Temperatures. Robert A. Buerschaper. *Journal of Applied Physics*, v. 15, May '44, pp. 452-454.

Theory, experimental arrangement and procedure, results. 2 ref.

2-24. The Metallurgy of Modern Alloys. R. H. Harrington. *Steel Processing*, v. 30, May '44, pp. 299-301.

The concept of lattice strain, as the pressure variable for metallic phase systems: Pressure-temperature-concentration planes defining phase systems. Pressure-temperature diagrams for some pure metals. Standard temperature-composition diagram for the copper-tin system.

3. PROPERTIES OF ALLOYS

3-73. Why Not a 50:50 Cobalt-Copper Alloy? Colin G. Fink and J. Laurence Hutton. Electrochemical Society Preprint No. 85-18, 12 pp.

Attempts were made to prepare a workable alloy of equal parts of copper and cobalt by two different methods. Neither of these two methods resulted in a true 50:50 alloy.

3-74. The Scaling Properties of Steels in Furnace Atmospheres at 1150° C. A. Preece and R. V. Riley. The Iron and Steel Institute. Advance Copy, 14/1943, March '44, 18 pp.

Rate of oxidation and the character of the oxide formed in furnace atmospheres at 1150° C. were examined for a selection of carbon and alloy steels. An account is given of the important influence of SO_2 and O_2 in the furnace atmosphere in governing the process of oxidation. 3 ref.

3-75. Effect of Wartime Developments on Future Steels. W. P. Eddy, Jr. Society of Automotive Engineers *Journal*, v. 52, May '44, pp. 169-182.

Fatigue endurance, heat treatment, castings, welding, alloy evaluation, hardenability as a primary requirement, special addition agents, and NE steels.

3-76. The Effect of Combined Stresses on the Ductility and Rupture Strength of Magnesium-Alloy Extrusions. E. G. Thomsen and J. E. Dorn. *Journal of the Aeronautical Sciences*, v. 11, April '44, pp. 125-136.

Data reveal that the materials investigated obey the critical shear stress law for rupture. The rupture stress, however, depends upon the conditions of anisotropy, ductility under combined stresses and work hardening. 27 ref.

3-77. National Emergency Steels. Norman E. Woldman and Robert C. Gibbons. *Steel*, v. 114, May 1, '44, pp. 116-118, 150-151.

May prove to be permanent and valuable addition to list of alloy steels, maker of aircraft parts finds in making extensive tests.

3-78. Modification of Steel Projects by Lead. *Industrial Chemist*, v. 20, March '44, pp. 138-143.

Effects on machinability and other characteristics. 6 ref.

3-79. Cast Iron as Construction Material. E. Piwowarsky. *Engineers' Digest*, v. 1, April '44, pp. 269-272.

Cast iron as a brittle material; rolling of cast iron; reinforced cast iron. 10 ref.

3-80. A Study of Austenitic Grain Growth in Medium Carbon Steels. J. H. Whiteley. *Engineers' Digest*, v. 1, April '44, pp. 305-307.

Results obtained suggest that the state and character of the carbide as the critical stage is entered, are among the main determining factors. Ferrite precipitation method adopted for study.

3-81. Strength of Light Alloy Components. J. L. Beilschmidt. *Aircraft Engineering*, v. 16, March '44, pp. 76-81.

The relation of stress and strain curves and proof loads to the design requirements of aircraft structural components.

3-82. At Last—One Alloy Steel. Metallurgicus. *Metal Progress*, v. 45, May '44, pp. 901-902.

Discussion of article by Harry Brearley concerning restrictions in steel specifications.

3-83. Thermal Expansion of High-Silicon Cast Iron. Peter Hidnert and George Dickson. Bureau of Standards *Journal of Research*, v. 32, April '44, pp. 145-149.

Data on the linear thermal expansion of high silicon cast iron containing approximately 14% S; with 3% Mo and without appreciable Mo at various temperatures between 20° and 700° C. Differences between the coefficients of expansion of these high silicon cast irons were found to be slight. Both high silicon cast irons were found to have slightly higher coefficients of expansion than electrolytic iron for temperature ranges between 20° and 300° C., and appreciably higher coefficients for higher temperature ranges. No indication of growth similar to that of ordinary cast iron was observed on heating the high silicon cast iron to 700° C. 6 ref.

3-84. 16:2—The Forgotten Stainless Steel. Max E. Tatman. *Iron Age*, v. 153, May 11, '44, pp. 70-71, 160.

The 16:2 (Type 431) type of stainless steel has only recently been used extensively in the U. S. This alloy has a definite advantage over regular 18:8 stainless steel from a strength-weight ratio standpoint. This is most important in modern aircraft design, especially in the case of seaplanes.

3-85. Notched-Bar Tensile Test Characteristics of Heat-Treated Low-Alloy Steels. G. Sachs, J. D. Lubahn and L. J. Ebert. *Welding Journal*, v. 23, May '44, pp. 247-s-248-s.

Effects of variations in surface conditions at the root of the notch, variations in notch radius, and eccentricity of loading on the results of notched-bar tensile tests on heat-treated low-alloy steels. 5 ref.

3-86. Internal Mechanics of Cast Iron. Gustav Meyersberg. *Iron & Steel*, v. 17, April '44, pp. 323-328.

Inherent properties in the light of recent German research. The breaking process in steel: "Parting" strength; process of breaking in cast iron; progress of cracks; stress peak location; notch factor; ascertaining the notch effect by outside measurements; application to existing experimental determinations; breaking stress; Rudeloff's data. 19 ref.

3-87. Notes on Magnesium-Alloy Technology. F. A. Fox. *Engineering*, v. 157, April 7, '44, pp. 278-280.

Choice of casting alloys, wrought alloys, surface protection, machinability, recent research and development work on magnesium alloys, applications.

3-88. Special Addition Agents. *Iron & Steel*, v. 17, April '44, p. 312.

Effects on hardenability of ferro-alloys containing boron.

4. STRUCTURE

4-11. The Structure of Martensite. H. Lipson and A. M. B. Parker. *Engineers' Digest*, v. 1, April '44, pp. 280-281.

Assumptions made in determining that carbon is present in martensite; the percentage of carbon in the martensite.

5. POWDER METALLURGY

5-14. Presses and Processes for Metal Powder Products. E. V. Crane and A. G. Bureau. Electrochemical Society Preprint No. 85-14, 23 pp.

The powder metallurgy art as it exists in America today. Standard methods of making a wide diversity of powder metal machine parts and finished products. Recommended procedures for making composite articles of metal and non-metal, such as abrasive wheels. Special machinery for making a wide diversity of compacts.

5-15. The Determination of Particle Size in Powder Metallurgy. Philip R. Kalischer. Electrochemical Society Preprint No. 85-15, 6 pp.

Four methods for sizing fine powders are described and discussed: Microscope; air elutriation; liquid elutriation; and gravitational fractionation.

5-16. Bonding Metal Particles by Heat Alone Without Pressure. Laurence Delisle. Electrochemical Society Preprint No. 85-16, 16 pp.

The results of microscopic examination and a few physical tests of specimens made of metal powder by sintering in hydrogen for three hours at various temperatures. Iron, copper and silver powders were investigated. Particle size is a very important factor on the extent to which bonding between particles proceeds and on the density of the sintered specimens. 13 ref.

5-17. Superfine Grinding of Metal Powders. *Light Metals*, v. 7, April, '44, pp. 157-160.

Resume of recent research by Olbrich on comminution of aluminum in the vibrating ball mill.

6. CORROSION

6-13. "Season Cracking" in Cartridge Brass. L. E. Gibbs. *Metal Progress*, v. 45, May '44, pp. 881-886.

Cartridge brass is high enough in zinc to be among the alloys susceptible to stress corrosion. To avoid it in ammunition, residual internal stress must be held below a certain value. 5 ref.

6-14. Passivity in Copper-Nickel and Molybdenum-Nickel-Iron Alloys. Herbert H. Uhlig. Electrochemical Society Preprint No. 85-20, 10 pp.

Passivity in an alloy appears at a critical composition which for ferrous alloys is related to the tendency of the d band of electronic energy states to fill with electrons. According to magnetic and specific heat data it is known that the d band of Cu-Ni is filled at 60 atom % Ni. Corrosion data show that transition from passivity to activity occurs at this same nickel content.

6-15. Chemical Treatment of Magnesium for Enamelling. *Light Metals*, v. 7, April '44, pp. 173-176.

Results of comparative corrosion tests on magnesium alloy sheet, chemically pre-treated in phosphate or chromate baths with subsequent coating with gray, synthetic stoving enamel.

6-16. Corrosion Resistance of Some Commercial Aluminum Alloys in Seawater. J. F. J. Thomas and A. C. Halferdahl. *Canadian Chemistry and Process Industries*, v. 28, April '44, pp. 257-259.

Five aluminum alloys were exposed bare, alumilited, and sealed with dichromate, and Bengough-Stuart treated at the half-tide position near Halifax, N. S., and at Esquimalt, B. C. They were also put in aerated Atlantic seawater in a total immersion test in the laboratory and in a salt spray test.

6-17. High-Temperature-Steam Corrosion Studies at Detroit. I. A. Rohrig, R. M. Van Duzer and C. H. Fellows. American Society of Mechanical Engineers *Transactions*, v. 66, May '44, pp. 277-290.

Determines the rate of corrosion and the relative corrosion resistance in an unstressed condition of various materials that could be used in the construction of steam generators, piping, and turbines. Specimens were exposed in a steam atmosphere at 380 psi. and at temperatures of 925 and 1100° F. The investigation required 5 years for completion. 46 different materials were studied under plant-operating conditions, and samples were exposed in superheated station steam for periods ranging from 4000 to 16,000 hr. Weight-loss, hardness, and metallographic data were obtained after successive exposure periods for many of the samples. Trends in the corrosion rate were plotted for some of the materials.

6-18. The Corrosion of Alloy Steels by High-Temperature Steam. G. A. Hawkins, J. T. Agnew, and H. L. Solberg. American Society of Mechanical Engineers *Transactions*, v. 66, May '44, pp. 291-295.

Additional test results obtained at the Engineering Experiment Station of Purdue University dealing with the relative resistance to corrosion by steam of unstressed specimens of various alloy steels at temperatures between 1000 and 1800° F. All of the steels tested, except for the very high chromium-nickel alloys, show rapid corrosion beyond a limiting temperature which increases with chromium content. Data are presented relative to the chemical composition of the scale layers formed during tests at 1500 and 1800° F.

A. S. M. METAL LITERATURE REVIEW

6-19. Surface Protection of Aircraft Parts. V. S. Sorenson and S. G. Andrews. *Iron Age*, v. 153, May 18, '44, pp. 74-77.

Research program carried out by Lockheed Aircraft Corp., to solve finish problems arising from the increased use of low carbon steels in place of nickel-bearing stainless steels; growing importance of galvanic corrosion in aircraft construction and fundamental concepts of this type of corrosive attack discussed. Results of investigations on comparative protection afforded by various combinations of phosphate treatments and additional coatings also given, and finishes now in use on various steel parts listed.

7. PROTECTION

7-48. Spraying Molten Metal. Francis A. Westbrook. *Printing Equipment*, v. 67, April '44, pp. 14-16.

Provides means for restoring worn or damaged machine parts to original size. Technique of process described.

7-49. Phenolic Resin Baking Finishes for Protection Against Corrosion. R. L. Norum. *Chemical Industries*, v. 54, April '44, pp. 524-528.

In the fight against chemical corrosion, resin baking finishes are finding increased application in the chemical process industries. Their service characteristics, where and how they may be used, and some typical applications are described.

7-50. Magnesium Alloys Surface Treatment and Corrosion. S. H. Phillips. *Western Metals*, v. 2, May '44, pp. 19-20, 23-24.

The performance and applications of the present surface treatments commonly used as base protective finishes.

7-51. Metal Finishes at War. Burr Price. *Products Finishing*, v. 8, May '44, pp. 24-26, 28, 30, 32, 34, 36.

Metal finishes in battle; paint and air power; marine painting is never finished; on the home front; manufacture and supply; new materials and methods.

7-52. The Theory and Use of Zinc Chromate Primers. Paul O. Blackmore. *Industrial Finishing*, v. 20, May '44, pp. 24, 26, 28, 30, 32, 34, 36, 38.

Why zinc chromate primer is used; how it protects the surfaces of metal from corrosion; how to use it to get best results; what tests and precautions to observe when you are using it.

8. ELECTROPLATING

8-38. Further Experiments in Rainbow Plating. Oliver P. Watts. Electrochemical Society Preprint No. 85-13, 2 pp.

Electrodeposition of brilliantly colored plates on metallic cathodes from a hot solution of ammonium molybdate. The results of further experiments with this solution are presented and also an account of the production of similar colors on anodes in a solution of sodium plumbate.

8-39. The Chemistry of Electroplating. C. B. F. Young. *Products Finishing*, v. 8, April '44, pp. 54-56, 58, 60, 62.

Compounds of nitrogen and their properties.

8-40. Salvage by Electrodeposition. Harold Narcus. *Metal Finishing*, v. 42, May '44, pp. 267-269.

Heavy nickel plating offers the following principal advantages: Ease of machining of nickel after heavy plating as compared to chromium; higher current efficiency, faster rate of deposition and better throwing power of the nickel plating bath; cheaper installation resulting from cheaper rack and plating tank construction; less power consumption for plating.

8-41. The Chemistry of Electroplating. Part 8. C. B. F. Young. *Products Finishing*, v. 8, May '44, pp. 58-60, 62, 64, 66.

Properties of free element Na; properties of combined element dissolved Na; Cl; combined Cl.

8-42. The Fundamentals of Chemistry for Electroplaters. VII. Samuel Glasstone. American Electroplaters' Society. *Monthly Review*, v. 31, May '44, pp. 443-446.

Chemical reactions, chemical equations, weights in chemical reaction, other chemical reactions.

9. ELECTROMETALLURGY

9-8. Electrolytic Hydrogen Cells of Trail Design. B. P. Sutherland. Electrochemical Society Preprint No. 85-12, 7 pp.

Characteristic feature of the cell is the concrete top which supports the electrodes, the asbestos diaphragms, the asbestos collecting skirt, the feed water pipes, and the bus bar and gas main connections. The life of the new cells is better than six years. The cost of the new cells is a little over half that of older types.

10. ANALYSIS

10-20. Chemical Analysis by Powder Diffraction. Ludo K. Frevel. *Industrial and Engineering Chemistry*, Analytical Edition, v. 16, April '44, pp. 209-218.

Examples of use of the powder diffraction method in the chemical identification of solids, and some of the general difficulties that may be encountered in its use. 63 ref.

10-21. Determination of Carbon by the Low Pressure Combustion Method. W. M. Murray, Jr. and S. E. Q. Ashley. *Industrial and Engineering Chemistry*, Analytical Edition, v. 16, April '44, pp. 242-248.

Apparatus redesigned to increase the speed of manipulation. Detailed description of the equipment and its manipulation, together with an account of experimental studies on the method. Results are also shown for the carbon content of copper. 13 ref.

Materials Index

To the Metal Literature Survey

THE FOLLOWING tabulation classifies the articles annotated in the preceding pages according to the metal or alloy concerned. The articles are designated by section and number. The section number appears in bold face type and the number of the article in light face.

General Ferrous

1-57-59-62-65; **5**-16; **13**-14; **14**-181; **16**-60-61-67-72; **18**-107; **19**-137; **22**-245; **25**-129-131.

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3-79-83-89; **12**-115; **14**-174-176-177-182-186-195; **22**-243.

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3-74; **13**-10; **14**-179-197-198; **18**-98; **22**-189-223; **23**-138.

Wrought Carbon Steel

3-78-80; **6**-19; **10**-21-22; **12**-102-117-119; **16**-62; **18**-93-94; **19**-100-101-102-103-129-135-138-139-143; **21**-52; **22**-188-194-223-241-243-244.

Alloy Steel

1-61; **3**-74-75-77-82-85-88; **6**-14-18; **17**-20; **18**-93-95-100-105; **19**-108-131-140-141; **22**-188-240; **23**-166.

Stainless and Heat Resisting Steel

3-84; **6**-19; **21**-67; **22**-235-238; **23**-141.

Tool Steels and Carbides

10-26; **18**-97-100-106-108; **19**-104-105; **20**-158-158-174; **22**-178-200-236.

Ferro-Alloys

3-88; **16**-76.

General Non-Ferrous

14-180-189; **19**-137.

Aluminum

3-81; **5**-17; **6**-16; **11**-60; **12**-102-110; **15**-18; **18**-104; **19**-111; **20**-170; **21**-53-56-71; **22**-204-209-223; **23**-143-144; **25**-118-119-120.

Magnesium

1-53-63-64; **2**-22; **3**-76-87; **6**-15; **7**-50; **11**-102; **14**-173-178-184-188-190-192-199-203-204-205; **16**-74; **19**-111-132-136; **21**-54; **22**-210; **23**-143-144.

Copper, Brass and Bronze

3-73-86; **5**-16; **6**-13-14; **10**-21; **14**-175; **19**-122-130; **22**-183-186-215; **23**-153.

Nickel, Monel and Nickel Alloys

1-54-60; **6**-14; **8**-40.

Lead and Lead Alloys

3-78; **26**-60.

Tin and Tin Alloys

1-55; **3**-86; **10**-23.

Zinc and Zinc Alloys

1-56; **19**-98; **25**-55-58-59.

Miscellaneous and Minor Metals

1-58-61-66; **3**-73; **15**-20; **19**-119; **26**-56.

10-22. Determination of Carbon in Low-Carbon Steel. R. W. Gurry and Hastings Trigg. *Industrial and Engineering Chemistry*, Analytical Edition, v. 16, April '44, pp. 248-250. 2 ref.

The precision of the low pressure combustion method described appears to be at least three times that of the standard combustion method when used on low carbon steel. Its accuracy, as determined by direct calibration on Iceland spar, is about 0.0007% carbon, again about three times that of the standard combustion method. 2 ref.

10-23. Colorimetric Determination of Tin with Silicomolybdate. Irvin Baker, Martin Miller, and R. Stevens Gibbs. *Industrial and Engineering Chemistry*, Analytical Edition, v. 16, April '44, pp. 269-271. 17 ref.

A rapid and accurate colorimetric determination of tin, for concentrations ranging from 0.0005 to 0.5%. The method is an excellent routine procedure requiring no special technique or apparatus other than a comparator or filter photometer. 17 ref.

10-24. Micro-Analysis and the Railway Chemist. G. H. Wyatt. *Metallurgia*, v. 29, March '44, pp. 273-275.

The railway chemist must be equipped to cope with diverse analytical demands. The many valuable directions in which microchemical methods of analysis have been developed are clearly illustrated by this account of some of the ways in which a railway chemist has been able to solve his problems. 10 ref.

10-25. Identification of Metallic Minerals. *Mine and Quarry Engineering*, v. 9, April '44, pp. 81-86, 97.

Determination and localization of ore constituents with special reference to the contact print method and its applications.

10-26. Spotting Cobalt High Speed. A. J. Scheid, Jr.; George A. Roberts. *Metal Progress*, v. 45, May '44, pp. 903-904.

Distinguishing high speed steel containing cobalt by appearance of scale and by drop of concentrated hydrochloric acid.

10-27. Photoelectric Colorimetry. E. C. Pigott. *Iron & Steel*, v. 17, April '44, pp. 319-322.

Use of photocells in quantitative metallurgical analysis.

11. LABORATORY APPARATUS, INSTRUMENTS

11-48. Fundamentals of Industrial Electronics. G. M. Chute. *Steel*, v. 114, May 1, '44, pp. 120, 123, 126, 128, 152-154.

Electronic control of heat applied by resistance welders. Phase-shift circuit makes it possible to change quickly and accurately the amount of weld current through the primary of transformer.

11-49. Fundamentals of Industrial Electronics. G. M. Chute. *Steel*, v. 114, May 8, '44, pp. 126, 128, 130, 132, 163-164, 167.

High speed photo-electric relay which can operate on changes in light lasting only one-thousandth of a second and is useful for such applications as fast, precision cutoff machines.

11-50. Tubes in Metallurgy-II. E. V. Potter. *Electronic Industries*, v. 3, May '44, pp. 115-117, 288, 290.

Details of sonic flocculating apparatus, magnetic property analysis and chemical measuring equipment.

11-51. Automatic Control Equipment III — Electrically Operated Controls. W. H. Steinkamp. *Industry & Power*, v. 46, May '44, pp. 71-73, 87.

Explains two-position and floating control motors, the various developments in proportioning controls—such as triple-function reset—and electrical input controllers.

11-52. Electronics for the Machine Designer. G. A. Caldwell and Carl Madsen. *Machinery*, v. 50, May '44, pp. 135-150.

Fundamentals of electronics and the ways in which electronic devices can be advantageously applied in the mechanical field.

11-53. An Inexpensive Photometer for Metallographers. P. A. Haythorne and R. W. Powell. *Iron Age*, v. 153, May 11, '44, pp. 66-69.

Photometer arrangement of low cost especially adapted to metallographic functions. Use of the equipment saves time and furnishes consistently uniform and well exposed negatives.

11-54. Fundamentals of Industrial Electronics. G. M. Chute. *Steel*, v. 114, May 15, '44, pp. 121, 124, 126, 146, 148, 150, 152, 154, 156, 158.

Application of electronics in providing stepless controls over motor speeds.

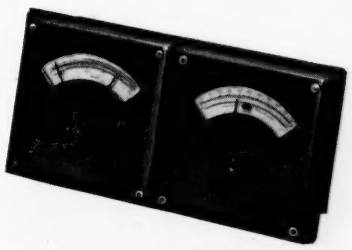
11-55. The Theory and Design of Electronic-Control Apparatus. W. D. Cockrell. American Society of Mechanical Engineers *Transactions*, v. 66, May '44, pp. 249-258.

Explanation of theory and design of electronic apparatus. The almost infinitely fast and inertialess electronic tube can supplement mechanical control. Fundamental conceptions of the electronic tube, describing the types of tubes used and the operation of individual control circuits. Practical applications.

11-56. Application of Electronic Control. E. H. Vedder. American Society of Mechanical Engineers *Transactions*, v. 66, May '44, pp. 259-264.

Motor controls including an adjustable-speed drive for direct-current motors and a speed-regulator system are shown. The importance of resistance welding in production of sheet-metal assemblies and the use of ignitron equipment for control of time and current are discussed. Pinhole detection in steel strip.

(Continued on page 5)



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The REVIEW
THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

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M. R. Hyslop.....*Managing Editor*

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Volume XVII Number 6

Malcolm Tells About Testing Devices for Shop and Laboratory

Reported by H. P. Henderson
Prod. Engr., New Departure Division, G.M.C.

All phases of laboratory and shop testing devices and methods are used by the Chapman Valve Mfg. Co. for the control of the product, and for research and development, according to V. T. Malcolm, director of research, who addressed the April meeting of the Hartford Chapter A.S.M.

The speaker showed many slides of testing equipment covering such fields as spectroscopy, micro-analysis, dilatometry, radiography, X-ray diffraction, radium, Magnaflux and Zyglo, Arcronograph tests for welding, testing at very high and very low temperatures, wear testing, stress analysis by brittle lacquer, SR-4 strain gages and photo-elasticity.

Mr. Malcolm claims that the use of the spectrograph for steel analysis undoubtedly will be adopted in a great many industries as it is more rapid and costs approximately one-third as much as wet methods. A miniature setup for micro-analysis is used to determine small particles of foreign matter in material.

Considerable work is carried out to determine the thermal characteristics of steel by use of dilatometers, expansion apparatus, and end-quench. Quenching of steel castings has proven of great advantage particularly in highly stressed work, Mr. Malcolm claimed.

Work on high temperature creep, relaxation and hardness is being carried out in specially designed machines, including the Monotron and Eberbach hardness testers.

The speaker mentioned the use of X-ray diffration apparatus for determining patterns so that heat treating and residual stresses may be studied; this instrument has improved heat treatment to such an extent that much longer tool life is obtained.

Interesting pictures of joining castings by welding were shown and the use of the Arcronograph illustrated. This instrument graphically plots any overshooting or undercutting during welding.

Stainless Steels Classified, Applications of Each Type Described

Reported by John E. Comfort
Pacific Metal Co.

"Stainless Steels, Their Selection and Uses" was the subject of a talk by Stanley P. Watkins of the Rustless Iron and Steel Corp. at the regular meeting of the Oregon Chapter A. S. M. on April 28.

Mr. Watkins classified the stainless steels into three groups: First, the martensitic group, which may be hardened by heat treatment; second, the ferritic or non-hardening group; and third, the austenitic group, which may be hardened only by cold working.

Mr. Watkins, with the assistance of lantern slides, further duscussed the properties of many of the types of stainless steel in each of the three groups. He also told of applications and methods of handling.

Following the business meeting and preceding Mr. Watkins' talk, A. C. Neves, Brazilian Consul, told of the habits of the Brazilian people and their assistance in the war effort. Mr. Neves' message was illustrated by the color film, "Rio, the Marvelous City."

Meet to Organize North Texas Chapter

National and Chapter Officers Met With Others Instrumental in the Formation of the New North Texas Chapter of the A.S.M. at a Luncheon Meeting on May 24. Left to Right, the organizers are: Robert V. Wheeler, Chapter chairman; Kent R. Van Horn, national vice-president; J. K. Grace, Chapter secretary; W. H. Eisenman, national secretary; C. E. Perkins, Chapter treasurer; C. D. Havens, Magnaflux Corp.; J. K. Elliott, Pittsburgh Testing Laboratory of Texas; K. V. Alexander, Aluminum Co. of America; R. A. Stewart, Chapter vice-chairman; and H. H. McKinney.

Cutting Edge of Tools Important Machinability Factor

Reported by E. J. Pavesic
Studebaker Aviation Division

The new Fort Wayne Chapter of the A.S.M. had a capacity attendance of about 150 at its second meeting on April 25. The technical speaker, W. H. Oldacre, president and general manager of the D. A. Stuart Oil Co., Chicago, spoke on "The Machinability of Metals and the Effects of Cutting Fluids."

Factors affecting machinability are the material being machined, its hardness, ductility and microstructure, types of tools used, coolants and lubricants, rigidity of the machine, and the personal element of the machinist, Mr. Oldacre said.

The mechanism of chip formation and the various types of chips encountered in machining were illustrated and discussed. Surface finish of the cutting edge of the tool is extremely important with respect to its performance and to the surface finish of the work being machined. Loads on the cutting edge of a tool are of tremendous proportions and yet at times more attention is given to the part being machined than to the tool doing the work.

Uses and effects of sulphur and chlorine in cutting oils and compounds, and testing methods used in evaluating these effects, were illustrated and discussed.

Crucible Steel Co. of America, through Roy Slaughter of the Indianapolis office, exhibited numerous Rexalloy cutting tools and had several experts on hand to discuss proper tool applications and specific machining problems.

Glass Coating Protects Rod and Wire From Oxidation

A new method of glass coating steel rod and wire which eliminates acid cleaning operations by mechanical means is described in an article by John J. Caughlerty in the May 1944 issue of *Wire and Wire Products*, page 299.

In this process spray guns are suitably located to spray molten glass on all surfaces of the hot rod as it exits from the finishing pass, or just as it enters the reel guide. The glass coating will insulate the rod against further oxidation through its cooling temperatures. As the rod cools below oxidizing temperatures the coating will separate from exposed sections removing what oxides are formed with it.

The rod is drawn to wire according to usual practice and then transferred to the galvanizing department and passed through a container of molten glass, heated to approximately 2000° F. On cooling to below oxidizing temperature, the glass coating separates, removing any oxides formed with it, effecting a perfectly annealed, clean surface. It can then be passed directly through a flux, into the zinc or spelter bath as of regular practice.

The article describes experiments on scaled and bright finishes on low and high carbon, stainless and other grades of steel, to determine speeds of operation, correct types of glass, means of application, surface effects, length of immersion in the molten glass, metallurgical examination, correct type of furnace material and sinker bars.

The method so far has been applied only to wire products and narrow widths of stainless steel strip, but there is no reason to believe that it cannot apply to all grades of strip, sheet, and bar steel. It is claimed to result in improved quality, increased production, reduced costs, and savings in metal loss.

Charter Presented to New ASM Chapter in Dallas

The initial meeting of the North Texas Chapter of the American Society for Metals was held in Dallas May 24, with National Vice-President Kent R. Van Horn as the technical speaker. National Secretary W. H. Eisenman presented the official chapter charter to ROBERT V. WHEELER, aeronautical and industrial engineer and chairman pro tem of the Chapter. Other temporary officers are:

Vice-Chairman—ROBERT A. STEWART, Chief Chemist and Metallurgist, Continental Motors.

Secretary—J. K. GRACE, Process Engineer, North American Aviation Texas Division.

Treasurer—C. E. PERKINS, North American Aviation Texas Division.

Earlier in the day a luncheon meeting was attended by the temporary officers, Messrs. Van Horn and Eisenman, and others instrumental in the organization of the new Chapter. Paul Carrington, chairman of the Dallas Chamber of Commerce Post-War Committee, explained the importance of such a group to the industries of Dallas and surrounding territory. Dr. Van Horn discussed aluminum and aluminum alloys at the evening meeting.

Named Vice-President of Acme Pattern and Machine Co.

OTTO W. WINTER has been appointed vice-president of the Acme Pattern and Machine Co. of Buffalo, N. Y. A former national president of the American Society of Tool Engineers and a member of the Buffalo chapter A. S. M., his experience after several years as an itinerant toolmaker includes the following:

O. W. Winter

President and works manager, Sav-Way Industries, Detroit; vice-president in charge of manufacturing, Republic Drill and Tool Co., Chicago; factory manager, Columbus McKinnon Chain-Chisholm Moore Hoist Corp., Tonawanda, N. Y.; industrial engineer, Kent-Owens Machine Co., Toledo, Ohio; general manager, cutter and special tool division, Whitman and Barnes, Inc., Detroit; tool engineer and sales engineer, Cincinnati Milling and Grinding Machines, Inc., Cincinnati, Ohio, and a period in Russia as a consultant on machine tool and cutting tool manufacture to the Soviet government.

Mr. Winter personally engineered the Russian milling cutter design standards. Currently he is national chairman of the Education and Training Committee of the American Society of Tool Engineers.

Almen Tells Effect of Residual Stresses

Reported by G. B. Berlien
Metallurgical Engineer, Lindberg Steel Treating Co.

Chicago Chapter members and guests marked April 13 as a red letter day in their calendar of technical meetings when they heard J. O. Almen, General Motors Research Laboratories, discuss "The Effect of Residual Stresses on the Strength of Metals". The practical demonstrations and the slides used to illustrate Mr. Almen's remarks were of unusual interest and clarity, thereby driving home his every point in a manner that everyone could understand.

Cincinnati WPAC Instigates Program Of Steel Simplification

How the War Products Advisory Committee of the Cincinnati Chapter A. S. M. instigated a plan for simplification of steel compositions is described in a comprehensive article in the April 24th issue of *Steel*, page 94.

Written by G. W. Birdsall, associate editor, the article describes how, under the direction of S. T. Olinger, then chairman of the Cincinnati A. S. M. War Products Advisory Committee, a subcommittee on steel simplification was formed in June 1942. Howard Montgomery, Lunkenheimer Co., was made chairman.

Other members were Jesse Daugherty, Cincinnati Planer Co.; Thomas A. Waltz, Cincinnati Steel Treating Co.; S. T. Olinger, Cincinnati Gas & Electric Co.; F. H. Pfefferle, Cincinnati Shaper Co.; Alfred Kullman, American Tool Works; W. O. Anshutz, Cincinnati Gear Co.; N. M. Salkover, Queen City Steel Treating Co.; H. Stanley Binns, Cincinnati Milling Machine Co.; A. L. Hartley of the R. K. LeBlond Machine Tool Co.

At the first meeting, NE 8615 for carburizing and NE 8744 for oil hardening were selected. All Cincinnati district machine tool builders were notified of this tentative selection and asked for comment. As a result, NE 8620 and NE 8744 were formally approved shortly thereafter.

When it was found that these steels were not to be readily available, it became evident that an industry-wide committee working direct with Washington would be the answer. Accordingly W. W. Tangeman, vice-president, Cincinnati Milling Machine Co., and a director of the National Machine Tool Builders' Association, appointed a committee on strategic materials for the Association. Its members were A. H. d'Arcambal, Pratt & Whitney Division, Chairman; Tell Berna, Association general manager; L. D. Slade, Gleason Works; A. L. Hartley, R. K. LeBlond Machine Tool Co.

Arrangements were made to have Mr. Hartley undertake an extensive series of tests to determine what NE steels were most suitable for the various critical parts of machine tools. Steels and applications specifically recommended as a result of these tests were:

NE 9415 for carburizing, in thin sections and small parts. NE 9420 for higher core hardness.

NE 9430 for straight heat treat, for studs, bolts or other small parts for high stresses.

NE 9445 for oil hardening small or medium size parts, or water hardening large pieces or heavy sections.

Practically every machine tool builder in the Cincinnati district is reported to have followed the recommendations of the Simplification Committee, according to Mr. Birdsall, who cites the experience of various users who took an active part in the Cincinnati program.

Armstrong, Oldest Chairman, Cuts Buffalo's 25th Anniversary Cake

Reported by George F. Kappelt
Assistant Metallurgist, Bell Aircraft Corp.

The annual meeting of Buffalo Chapter, A. S. M., celebrating its 25th anniversary, was held May 11. The dinner was high-lighted by an attempt by George J. Armstrong to cut the beautifully frosted wooden anniversary cake. Mr. Armstrong was the oldest past chairman present at the meeting, having held office in 1925.

At the business meeting following the dinner, election of officers was held, with George B. Michie becoming the new chairman. The secretary's report showed an increase in membership of 60 while the treasurer's report showed a net profit for the year. Walter Esau, retiring chairman, was presented with a past chairman's pin and plaque, and the evening was concluded with an enjoyable floor show.

Reid Returns From WPB to Timken

JAMES F. REID, former deputy chief of the Alloy Steel Branch of the War Production Board, has been appointed production manager of the Timken Roller Bearing Co., Canton, Ohio. Reid had been production manager of the Steel & Tube Division of the Timken Co. before obtaining a leave of absence in May, 1942, to join WPB. His responsibilities in this new capacity extend to all divisions of the company.

James Reid first joined the Timken Co. 25 years ago as an employee in the production department, becoming, ten years later, production manager of the Steel and Tube Division.

Metal Literature Review

11. INSTRUMENTS (*cont.*)

11-57. Air or Gas Measurement. *Iron & Steel*, v. 17, April '44, p. 318.

Instrument made by Walker, Crosweller & Co., Ltd., is claimed to have a number of advantages, especially for measuring large flows of gas, being of light weight, simple construction, and equally applicable to any diameter pipe and rate of flow, while it is not affected by pulsations, and dirty gas containing dust particles can be measured just as well as ordinary purified gas.

11-58. Electronic Devices Aid Metallurgical Research. E. V. Potter. *Electrical Engineering*, v. 63, May '44, pp. 175-185.

Electronic devices for temperature measurement and control, length and displacement measurements, and magnetic testing, and in induction furnaces and chemical and spectrographic analyses. 7 ref.

11-59. Fundamentals of Industrial Electronics. G. M. Chute. *Steel*, v. 114, May 22, '44, pp. 97-98, 100, 102, 142, 144.

Electronic heater. Induction long used in industry; in lower frequencies but more recent applications require power above 400,000 cycles per sec.

11-60. Electron Microscopic Determination of Surface Elevations and Orientations. R. D. Heidenreich and L. A. Matheson. *Journal of Applied Physics*, v. 15, May '44, pp. 423-435.

The methods of determining object thickness in electron microscopy. Uncertainties in interpretation of surface replicas from a consideration of intensities alone are discussed and three different replicas of etch figures in pure aluminum are presented. 18 ref.

11-61. A New "Instrumentation-Type" Air Gaging Method for Automatic Control of Machine Tools. Clarence Johnson. *Instruments*, v. 17, May '44, pp. 256-257, 304.

Instrumentation principles utilized in method disclosed, the purpose of which is to make possible extreme accuracy of repetition (within 0.0002 in.) in the automatic operation of certain types of metal-cuting machine tools.

11-62. Electric Gaging Methods for Strain, Movement, Pressure and Vibration. Howard C. Roberts. *Instruments*, v. 17, May '44, pp. 260-265.

Gaging methods based on variations of capacitance. 37 ref.

11-63. Ordnance Production Gaging. R. A. Bowman. *Instruments*, v. 17, May '44, pp. 266, 282-284.

The gage laboratory—its personnel.

11-64. Electron Tubes—Their Principles and Their Instrumentation Applications. Andrew W. Kramer. *Instruments*, v. 17, May '44, pp. 268-272, 288, 290, 292, 294, 296.

Principles of the phototube.

11-65. One Laboratory Inspects Gages for Lend-Lease. *American Machinist*, v. 88, May 25, '44, pp. 103-104.

Procurement, inspection and shipment of gages to Allied Nations is centered in the New York Ordnance District.

12. TESTING, INSPECTION AND RADIOGRAPHY

12-100. Radiographic Inspection. L. Mullins. *Welding*, v. 12, March '44, pp. 135-141.

Non-destructive examination of welds.

12-101. Realism in Metallurgical Treatment. A. C. Vivian. *Metallurgia*, v. 29, March '44, pp. 233-238.

Emphasizes the need for a new approach to the subject of metallurgy, so that engineers will have something fresh by which they can quickly gather how modern metallic materials come by their mechanical properties, and how these latter are modified again by all likely or possible conditions of preparation for use and of use itself.

12-102. Damping Capacity at Low Stresses in Light Alloys and Carbon Steel, with Some Examples of Non-Destructive Testing. L. Frommer and A. Murray. *Metallurgia*, v. 29, March '44, pp. 239-247.

Undertaken to establish a reliable and accurate method for measuring the damping capacity of materials, particularly metals; to establish the significance of the damping capacity as a physical property of the material in terms of other known characteristics; to determine what influence is exerted upon the measured damping by structural defects, such as cracks and porosity, and thus to afford means for non-destructive testing; and to determine the practicability of employing damping measurements as a means of quality control and inspection of raw material and finished components. 9 ref.

12-103. Some Physical and Wear Characteristics of Porous-Chromium-Plated Rings. Tracy C. Jarrett. Society of Automotive Engineers *Journal*, v. 52, May '44, pp. 222-224.

Data showing the effect of temperature upon the decrease in hardness of chromium plate. The time and temperature data on chromium plate indicate that the decrease in hardness occurs in a very short interval of time, particularly at temperature around 700° F. Actual field tests show that ring life is increased and barrel wear reduced when using porous-chromium-plated rings in the top groove of each piston.

12-104. X-ray Process Engineering. Robert Taylor. *Foundry*, v. 72, May '44, pp. 74, 141, 142.

Specifications, application, equipment, and procedure treated briefly. 7 ref.

12-105. Selecting, Evaluating, and Specifying Metallic Materials. H. W. Gillett. *Foundry*, v. 72, May '44, pp. 75, 184, 186, 188, 190, 192, 194, 196, 198, 200.

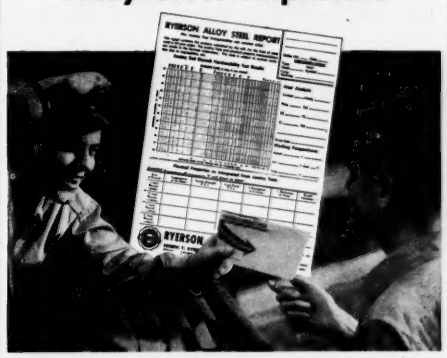
Properties of bearing metal, material for high temperature applications, and writing of specifications. 5 ref.

12-106. The Value of Radiographic Inspection to the Small Foundry. Robert Taylor. *American Foundryman*, v. 6, May '44, pp. 2-4.

The value of this non-destructive method of inspection is not limited to the detection of imperfect castings; rather, emphasis should be placed upon its worth as a means of improved foundry control for the production of sound castings. 3 ref.

(Continued on page 6)

Heat Treatment Data with Alloy Steel Shipments



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Metal Literature Review

12. TESTING & INSPECTION (*cont.*)

12-107. **Quality Control.** H. Howell. *Aircraft Production*, v. 6, April '44, pp. 198-201.
Three common misapplications of the system.

12-108. **Photoelectric Dimension Gage.** A. Edelman. *Electronic Industries*, v. 3, May '44, pp. 96-99, 256, 258, 260, 162.
Production-line inspection unit makes eight measurements on 20-mm. shells, delivering one shell per second.

12-109. **Supersonic Inspection Methods.** Boley A. Andrews. *Electronics*, v. 17, May '44, pp. 122-124.
Cracks, differences in hardness, changes in dimensions and variations in the composition of many materials can be quickly detected by new techniques utilizing supersonic frequencies. Three different methods, all involving electronic circuits, are described.

12-110. **The Measurement of Residual Stresses in Metals by the X-ray Back-Reflection Method, with Special Reference to Industrial Components in Aluminum Alloys.** Leopold Frommer and E. H. Lloyd. Institute of Metals *Journal*, v. 11, March '44, pp. 91-124.
A method capable of non-destructive measurement of the surface distribution of residual stresses by the determination of crystal-lattice strains, applied to coarse-grained material such as aluminum alloy castings and forgings, a type of specimen not previously regarded as amenable to this treatment. The method is developed so as to give, in addition, approximate figures for the distribution of stresses in depth.

12-111. **Identification of Brinell Balls.** *Metal Progress*, v. 45, May '44, p. 902.
Method of distinguishing tungsten carbide from steel balls.

12-112. **Identification of Negatives.** George L. Parrott. *Metal Progress*, v. 45, May '44, p. 903.
Small notches on rack of plate holder identify negatives.

12-113. **Statistical Methods of Quality Control.** Craig Stirewalt and Jean Bordeaux. *Iron Age*, v. 153, May 11, '44, pp. 56-60.
Examples of size variations occurring in simple screw machine products are charted to interpret the principles of the statistical method of controlling quality during manufacture. Interpretation of data plotted graphically.

12-114. **Hardenability From Cast Specimens.** E. S. Rowland. *Iron Age*, v. 153, May 11, '44, pp. 61-65.
Equipment used and technique employed at the Timken plant for casting Jominy end-quench specimens. Graphs showing typical results from cast and forged hardenability tests.

12-115. **Surface Fatigue of Plastic Materials.** Earle Buckingham. American Society of Mechanical Engineers *Transactions*, v. 66, May '44, pp. 297-310.
Influence of elastic deformation, destructive pitting, tests on cast-iron alloys.

12-116. **Procedures for Testing Metallizing Bond.** H. Ingham and K. Wilson. *Welding Journal*, v. 23, May '44, pp. 411-415.
Two procedures for standardizing testing methods for the adherence strength of sprayed metals. One is a test for shear strength, the other for tensile strength. These control quality of surface preparation in production and in working out procedures on new metals and coatings.

12-117. **X-Ray Blade Inspection.** John L. Bach. *Aero Digest*, v. 45, May 1, '44 pp. 88, 90.
American propeller has developed a process for the production of one-piece blades from seamless steel tubing, which involves forming the tube with shaping dies and internal pressure. The only welding required is at the tips and a short distance along the trailing edge, where the stresses are at a minimum.

12-118. **Graphical Method Simplifies Strain-Rosette Analysis.** J. H. Meier. *Machine Design*, v. 16, May '44, pp. 95-96, 174, 176.
Method of determining corrections for transverse gage sensitivity. Simplicity of the procedure offers many advantages over other methods, obviating the need for complicated tests to determine gage constants. 11 ref.

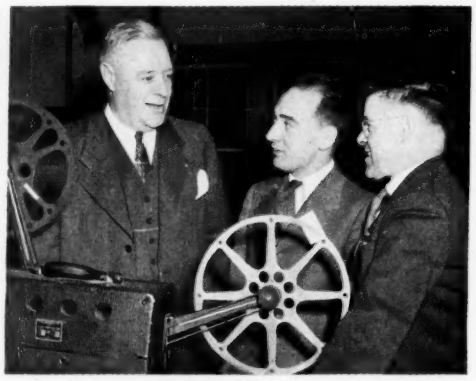
12-119. **Some Aspects of Commercial Production of Alloy Steels to Hardenability Requirements.** W. G. Bischoff. American Iron and Steel Institute Advance Paper, May 25, '44, 9 pp.
Cast tests vs. forged test results; comparison between positions in heat; correlation between various laboratories; hardenability as calculated from chemistry compared to actual results obtained.

13. TEMPERATURE MEASUREMENT AND CONTROL (PYROMETRY)

13-10. **A Thermocouple Method for the Measurement of Liquid Steel Casting-Stream Temperatures.** D. A. Oliver and T. Land. The Iron and Steel Institute Advance Copy, 5/1943, March '44, 9 pp.
Method of measuring the true temperature of the liquid steel in the casting stream. A platinum/platinum-rhodium thermocouple, lightly sheathed in silica, was allowed to protrude into the narrow part of the conical refractory lining of a runner box. The e.m.f. of the thermocouple was applied to a mains-driven high-speed amplifier and recorder, which showed that a steady temperature was attained in approximately 15 sec. The application of this method is illustrated.

13-11. **Barrier-Layer Photo-Electric Cells for Temperature Measurement.** T. Land. The Iron and Steel Institute Advance Copy, 6/1943, March '44, 31 pp.
Selenium barrier-layer photo-electric cell offers many advantages for the measurement of temperatures in the foundry. Such cells have previously been used for temperature measurement, but little has been known about their limitations or their calibration. Ten cells were investigated and their fatigue, their temperature coefficients and their departure from linear response were determined. The calibration of each cell was established, using a black-body furnace and a tungsten-ribbon filament lamp as sources of radiation. 16 ref.

Tool Grinding Movie Shown



Reported by John R. Dobie
Heat Treat Foreman, American Steel & Wire Co.

The first public showing of a color movie entitled "Grinding of Carbide Tipped Tools" was featured by the Worcester Chapter A.S.M. at its meeting on April 12. This was accompanied by an address by Charles K. Worthen, field engineer for diamond products, the Norton Co.

Shown in the photograph are, left to right, Charles K. Worthen, the speaker; J. Adams Holbrook, vice-chairman; and Albert B. Lyman, program chairman.

Immersion Thermocouple for Molten Steel Developed

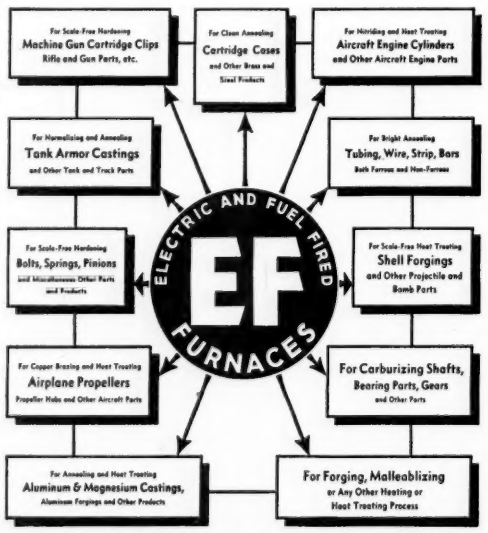
Metallurgists in Britain have developed a quick immersion thermocouple which when immersed in molten steel gives an accurate reading of temperature in 10 to 20 sec. The thermocouple of this instrument is an alloy of 13% rhodium-platinum versus platinum type, measuring 0.5 mm. diameter, and lightly sheathed in vitreous silica. It is plunged into molten metal in either the furnace, ladle or other container.

Known as the Schofield pyrometer for its inventor, Dr. F. H. Schofield, it is described in the May 15th issue of *Steel*, page 98, by Eric N. Simons.

Speed is the important feature of this means of measuring molten metal temperatures, the time of response being governed by the thickness of the thermocouple wires and their sheathing.

The portion of the instrument actually immersed in the metal may be either of diatomite brick or of electrode graphite. From this the wires of the thermocouple protrude approximately 2 to 3 in. In advance of each reading, a new silica sheath is placed over the wires and fastened to the diatomite or graphite block with refractory cement or asbestos string.

A more complete description of the instrument is found in Paper No. 5/1943 of the Steel Castings Research Committee of the British Iron and Steel Institute, published in March 1944 under the title "A Thermocouple Method for the Measurement of Liquid Steel Casting-Stream Temperatures" by D. A. Oliver and T. Land. This paper is abstracted in *Metallurgia*, April 1944, pages 307-310.



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Metal Literature Review

13. PYROMETRY (*cont.*)

13-12. **The Emissivity Characteristics of Hot Metals, with Special Reference to the Infra-red.** D. J. Price and H. Lowery. The Iron and Steel Institute Advance Copy, 7/1943, March '44, 24 pp.
Theoretical and practical considerations in connection with the study of emissivity and the relevant literature are critically surveyed. The application of emissivity data to the correction of pyrometer readings has been examined and the necessity of an adequate knowledge of emissivity data is indicated. 64 ref.

13-13. **The Drift of Selenium Photo-Electric Cells in Relation to Their Use in Temperature Measurement.** J. A. Hall. The Iron and Steel Institute Advance Copy, 26/1943, March '44, 11 pp.
Experiments made to investigate the "drift" effect in selenium barrier-layer photo-electric cells intended to be used for temperature measurement. It was found that the drift of seven of the nine cells examined was too great to permit of their use for the most accurate work.

13-14. **Temperature Reading of Molten Steel.** Eric N. Simons. *Steel*, v. 114, May 15, '44, pp. 98.
Quick-immersion thermocouple is developed in England for determining bath temperatures of molten steel. Immersion tube is made of either diatomite brick or electrode graphite and has a maximum life of six readings.

13-15. **Radiation Pyrometry in Turbosupercharger Testing.** V. P. Head. American Society of Mechanical Engineers *Transactions*, v. 66, May '44, pp. 265-269.
With increase in operating temperatures and speeds of turbines such as are used in turbosuperchargers, the demands for turbine-wheel and bucket temperature measurement have become increasingly exacting. Requests appear for such measurements under operating conditions with measurement tolerances varying from ±50°F. in flight test to ±5°F. in certain ground tests. Outlines the procedures used for measurements ranging from as low as 300°F. up.

13-16. **High-Speed Multiple-Point Potentiometer Recorder for Measuring Thermocouple Temperatures During Test-Plane Flights.** I. M. Stein, A. J. Williams, and W. R. Clark. American Society of Mechanical Engineers *Transactions*, v. 66, May '44, pp. 271-275.
Operating characteristics and performance in flight tests.

13-17. **Control Equipments for Induction Melting and Heating Units: II.** F. E. Ackley. *Industrial Heating*, v. 11, May '44, pp. 716, 718, 720, 722, 724, 742.
Various panel equipments incorporating controls for low frequency equipment, controls for higher frequency equipment, contactors and overload protection and the individual units which comprise in the aggregate the means for regulating electrical induction heating and melting equipment.

14. FOUNDRY PRACTICE AND APPLIANCES

14-173. **Causes and Cures of Defects in Magnesium Sand Castings.** Roy B. McCauley, and L. F. Mondolfo. *Metal Progress*, v. 45, May '44, pp. 905-910.
Lists oxide inclusions, improper flux and improper use of flux, oxide skins, blows, metallic impurities, shrinks and draws, cracks and faulty heat treatment as chief causes. Indicates ways to correct them.

14-174. **Speeding Graphitization of Malleable Iron.** C. H. Lorig. *Foundry*, v. 72, May '44, pp. 60-61, 144, 148, 150, 152, 154, 158, 160.
Coordination of foundry operations and metallurgical control is essential to shorten annealing time.

14-175. **Producing Copper-Zinc-Silicon Bronze.** R. J. Keeley. *Foundry*, v. 72, May '44, pp. 62-64, 162, 164.
Procedure followed in correcting certain casting defects. A major cause given for inability to produce sound castings from these alloys is overheating due to failure to recognize the high fluidities present at relatively low temperature.

14-176. **The Competitive Position of Gray Iron.** Donald J. Reese. *Foundry*, v. 72, May '44, pp. 65, 166, 168, 172, 174, 176.
Foundry process shortest; may have huge surplus; compare steel with plastics; consider strength-weight ratio; use more malleable; much progress made.

14-177. **Bethlehem Casts Largest Ingot Mold.** *Foundry*, v. 72, May '44, pp. 70-71, 178.
Corrugated one-piece ingot mold weighing 200 tons recently cast at the Bethlehem, Pa., plant of the Bethlehem Steel Co., is a record casting for the plant's iron foundry and probably is the largest and heaviest single piece iron ingot mold ever made.

14-178. **Produces Magnesium Castings.** Edwin Bremer. *Foundry*, v. 72, May '44, pp. 72-73, 134, 138, 140.
Procedures for making various types of magnesium castings and details on core production and sand handling.

14-179. **Around Detroit.** A. H. Allen. *Foundry*, v. 72, May '44, pp. 90, 93.
Metal penetration in steel castings is a matter of oxidation, and control over mold atmosphere will provide remedy for this problem, pinholes, scabs, etc. Addition to molding sand offers most practicable means of providing necessary reducing atmosphere.

14-180. **Metallurgy in the Non-Ferrous Foundry.** A. C. Boak. *Canadian Metals and Metallurgical Industries*, v. 7, April '44, pp. 30-32.
The metallurgist and the foundryman, metal purchases, chemical composition, fracture test.

14-181. **Titanium Bearing Graphitized Pig Iron.** *Iron Age*, v. 153, April 27, '44, pp. 47, 128.
The method for making the pig consists of charging the blast furnace with a mixture of Lake Superior hematite and some titanium bearing material such as ilmenite or rutile. In order to reduce the titanium oxide to completely dissolve Ti in the molten iron, the temperature in the combustion zone is maintained as high as possible and a larger than normal volume of basic slag is used. The process is covered by U. S. patent No. 2,298,483.

Metal Literature Review

14. FOUNDRY PRACTICE (*cont.*)

14-182. Quality Control in High Duty Iron Production. E. W. Harding. *Foundry Trade Journal*, v. 72, March 16, '44, pp. 219-223; March 23, '44, pp. 239-242.
Importance of ensuring constancy in casting performance.

14-183. Some Notes and Considerations of Practical Value to Foundrymen. F. H. Andrew. *Foundry Trade Journal*, v. 72, March 23, '44, pp. 243-245.
Book-learning must be supplemented by attentive study to practical experience.

14-184. Rapid Methods of Analysis for Sand Control in Magnesium Foundries. Eugene M. Cramer. *Foundry Trade Journal* v. 72, March 23, '44, pp. 247-248.
When inhibitors are present in improper quantities in magnesium foundry sands, they have a detrimental effect not only on the metal itself, but also jeopardize the production of quality castings.

14-185. Competitive Characteristics of Centrifugal Castings. John Putchinski. *Iron Age*, v. 153, May 4, '44, pp. 48-51.
What metals and what products can be cast centrifugally or centrifuged? What are the factors which determine the cost of manufacture centrifugally or by other methods?

14-186. Malleabilizing with CO-CO_2. *Iron Age*, v. 153, May 4, '44, p. 55.
Study of the reactions occurring during the decarburization of alloy and alloy-free irons with mixed CO/CO_2 atmospheres.

14-187. Cost Factors in Die Castings vs. Sand Castings. *Die Casting*, v. 2, May '44, pp. 25-26.
Reorders; die cost amortized.

14-188. Alloys for Die Castings, IV, Magnesium. *Die Casting*, v. 2, May '44, pp. 34-36.
Advantages, limitations, composition and physical properties of the alloys more commonly used for die castings. Magnesium, though one of the newer commerical metals, has had intensive development and holds a promising future.

14-189. Gravity Die-Casting of Non-Ferrous Alloys. E. H. A. Carlton. *Engineering*, v. 157, March 24, '44, pp. 237-239.
Gravity die-casting; sand casting; centrifugal casting; parts produced by hot stamping and pressing; extrusion.

14-190. Hills-McCanna Foundry Devoted Entirely to Magnesium Castings. Joseph Geschelin. *Automotive Industries*, v. 90, May 1, '44, pp. 30-32, 90.
Each case is treated as a research project leading to the establishment of the proper alloy, recommendations as to modifications in physical design, and development of suitable precision pattern equipment.

14-191. Precision-Casting Process Saves Machining Operations. *Product Engineering*, v. 15, May '44, pp. 293-298.
Old technique is revived and improved to turn out small wartime parts of intricate design demanding dimensional tolerances measured in thousandths of an inch. Further research and development may transform this casting method into a specialized field for industrial purposes.

14-192. Magnesium Alloy Foundry Sand Control. Oscar Blohm. *Iron Age*, v. 153, May 11, '44, pp. 74-77.
Described are the binders and inhibitors to be used and the preferable practice as regards mixing and mulling of foundry molding sand to give magnesium castings of soundness and smooth surface finish.

14-193. The Injection of Metal Into Die Casting Dies. H. K. Barton. *Machinery* (London), v. 64, March 30, '44, pp. 357-359.
Discussion of Frommer and Brandt's theory on flow of an ideal fluid.

14-194. Slip Coated Synthetic Foundry Sand. Felix Singer. *Foundry Trade Journal*, v. 72, March 30, '44, pp. 261-264.
A ceramist's views on foundry sand problems. 13 ref.

14-195. Quality Control in High Duty Iron Production. E. W. Harding. *Foundry Trade Journal*, v. 72, March 30, '44, pp. 265-270.
Importance of ensuring constancy in casting performance.

14-196. Education of the Foundry Worker. Douglas Jepson. *Foundry Trade Journal*, v. 170, March 30, '44, pp. 271-274, 276.
What can the foundry industry offer to youth?

14-197. A Symposium on Water-Quenched Steel Castings. C. W. Briggs. *Steel*, v. 114, May 22, '44, pp. 82-85.
Growing trend toward production and utilization of water-quenched and tempered steel castings.

14-198. Water-Quenching Small Steel Castings. J. W. Juppenlatz. *Steel*, v. 114, May 22, '44, pp. 84-86, 88.
Proper water quenching of steel castings is dependent upon hardenability of the steel which is a function of its analysis, the method of deoxidation used, and the cooling rate from the proper quenching temperatures which must be compatible with the analysis and sections involved.

14-199. Comments on Magnesium Alloy Sand Casting Practice. L. M. Nash. *Western Metals*, v. 2 May '44, pp. 25-26, 28.
Phases in the fabrication of magnesium alloy sand castings that are the most important to their quality and appearance.

14-200. Slip Coated Synthetic Foundry Sand. Felix Singer. *Foundry Trade Journal*, v. 72, April 6, '44, pp. 285-288.
A ceramist's views on foundry sand problems. 9 ref.

14-201. Design as Related to Casting Problems. *Foundry Trade Journal*, v. 72, April 6, '44, pp. 289-293.
A call to the foundry industry to tackle the problems of casting design themselves.

14-202. Design Features of Conveying Equipment for the Foundry Industry. F. B. Henry and G. N. Wileman. American Society of Mechanical Engineers *Transactions*, v. 66, May '44, pp. 235-248.
General applications, with consideration given to the design of some of the more important details. Emphasis has been placed on equipment used in the handling of sand, molds, and castings, since they offer the major opportunities for economies and savings in manufacturing costs.

(Continued on page 8)

Boston Chapter and Army Ordnance Association Meet

High Ranking Army Ordnance Officials Joined With Leading Metallurgists at the Annual New England Regional Meeting of the A.S.M., Held Jointly With The Boston Post of the Army Ordnance Association. Double head tables were backed by the Boston Port of Embarkation Band. (Courtesy of The Christian Science Monitor)

1500 Register at Regional Meeting, Hear Talks on Ordnance Research

Reported by L. Geerts
Republic Steel Corp.

With registrations reaching for the 1500 mark, the Boston Chapter A.S.M. as host, together with the Boston Post, Army Ordnance Association, greeted a tremendous overflow crowd at the New England Regional Meeting on May 5. All New England A.S.M. chapters were well represented, as well as Associated Industries of Massachusetts and New England Council, War Production Board.

A large and interesting exhibit was on display by numerous New England manufacturers and the U. S. Army. The large indoor display showed the varied ordnance materials being manufactured in this area and was supplemented with crew-attended mobile Army equipment outside. On display also were numerous pieces of captured enemy equipment.

Five papers were presented at morning and afternoon technical sessions. Speakers at the evening dinner were National A.S.M. President Marcus A. Grossmann; Secretary W. H. Eisenman; C. P. Dennett, president, Boston Post, Army Ordnance Association; and Brig. Gen. E. E. MacMorland, who spoke on "Supply and Maintenance of Army Ordnance Materiel to a Fighting Front."

At the morning technical session J. O. Almen, head of mechanical engineering department 1, General Motors Research Laboratories, spoke on "The Effect of Residual Stresses on the Strength of Metals."

A luncheon sponsored by War Production Board and Army-Navy Procurement Agencies was attended by 900. Donald Davis, vice-chairman of WPB in Washington, addressed the group.

G. B. Waterhouse, past national president A.S.M. and at present consultant, Foreign Economic Administration, Washington, D.C., acted as technical chairman for the afternoon session. The program included talks by John C. Solberg, chief, Inspection Division, Boston Ordnance District, on "New Trends in Ordnance Inspection"; by Harry McQuaid, assistant chief metallurgist, Republic Steel Corp., on "Trends in Steel Selection"; by George H. Reama, factory manager and director of labor relations, American Screw Co., on "War and Post-War Labor Relations"; and by Lieut. Col. G. B. Jarrett, chief, Foreign Materiel Branch, Ordnance Research Center, Aberdeen Proving Grounds, on "Enemy Equipment."

Boston Chapter Chairman James V. Baxter gave the address of welcome at the evening dinner session. "Uniting for a common purpose on this occasion," he said, "Army Ordnance, industry, metallurgy, and the War Production Board have joined together in a common objective to give to the manufacturers of New England the opportunity of obtaining vital information on production and results of battle experience of ordnance material produced in New England. . . .

"As one of the technological forces in the metal industry, the American Society for Metals has felt its definite responsibility in the field of metals. Along with industry it has accepted the responsibility for securing maximum production in the minimum amount of time. . . ."

Shop Practices for Induction Heating Illustrated

Reported by W. A. Mudge
The International Nickel Co., Inc.

Induction heating was discussed from the user's standpoint by A. A. Schwartz, Bell Aircraft Corp., Buffalo, N. Y., and from the standpoint of the manufacturer of equipment by N. Levin of the Induction Heating Corp., New York, at the final meeting of the year for the New York Chapter on May 8. J. W. Cable, Induction Heating Corp., was the technical chairman.

Mr. Schwartz compared production in the ordinary heating furnaces with that from induction equipment; the former method heats the work from without, and the latter heats the work from within with less oxidation and distortion. Illustrations of shop practices included dry case hardening, precision melting, control of temperature, utilizing a punch press for forging, and hardening the inside of seamless tubing.

Mr. Levin emphasized the wide range in design and installation of equipment which has been constructed for special requirements. Equipment is available for ferrous and non-ferrous materials, magnetic and non-magnetic materials, and for joining dissimilar metals.

Equipment for single and multiple operations was included and can be supplied with protective atmospheres when necessary. Induction hardening methods can be used for any steel which can be hardened by another method.

Allegheny Ludlum Appoints Two New Engineers

Allegheny Ludlum Steel Corp. has announced that LAURENCE C. HICKS, who has been in the company's research department since 1933, has been appointed metallurgical engineer and associate director of research in the Magnetic Products Division.

L. C. Hicks

Since 1936 Dr. Hicks has been conducting research on materials for the electrical industry, including silicon-iron alloys for magnetic core materials, alloys for sealing metal to glass, and high permeability iron-nickel alloys.

R. H. THIELEMANN has been appointed development engineer for Allegheny Ludlum. The author of several technical papers on metallurgy, he was formerly associated with the research laboratory of the General Electric Company at Schenectady, N. Y.

R. H. Thielemann

Mr. Thielemann was graduated from Oregon State College, and assisted in the development work and material studies for the Bonneville Dam Project.

After serving as a student engineer of the Bethlehem Steel Co. at their Pacific Coast plants, Mr. Thielemann joined the General Electric Co. in 1936. He pioneered in the development of high temperature creep-rupture testing technique, and since 1941 has worked on the development of precision casting processes for high melting point alloys and stainless steels.

Metal Literature Review—*Continued*

14. FOUNDRY PRACTICE (*cont.*)

14-203. The Use of Fluxes in the Melting, Refining and Casting of Magnesium-Base Alloys. E. F. Emley. *Magnesium Review*, v. 4, Jan. '44, pp. 3-13.

Melting technique for use with magnesium alloys. Behaviour of magnesium when heated in air and the nature and purpose of the fluxes which are used.

14-204. Preventive Measures in Respect of Run-Outs of Metal in Magnesium Foundries. S. B. Hirst. *Magnesium Review*, v. 4, Jan. '44, pp. 14-18.

The inspection and maintenance of crucibles, the design and maintenance of furnaces, steps to be taken in the event of the occurrence of a run-out.

14-205. The Sand Casting of a Typical Aircraft Component in a Magnesium Alloy. G. Goddard. *Magnesium Review*, v. 4, Jan. '44, pp. 19-26.

Sand casting of an aircraft component, a short series of experiments which were carried out to eliminate a defect which was responsible for a high proportion of rejected castings in production.

15. SECONDARY METALS

15-18. Down-Grading of Aluminum Casting Alloys. *Metal Progress*, v. 45, May '44, pp. 892-893.

Approximate equivalent specifications for aluminum casting alloys and substitution chart.

15-19. Reclamation of Non-Ferrous Scrap Metals and Alloys on the South African Railways. A. B. Sidey. *Foundry Trade Journal*, v. 72, March 23, '44, pp. 249-250.

South African experiments in the re-use of white metal.

15-20. War Plant From Scrap Pile. *Mining World*, v. 6, April, '44, pp. 14-16.

How the U. S. Vanadium Corp., acting for Metals Reserve Co., converted an old smelter into an efficient vanadium plant that with new materials would have cost a million dollars and taken many months longer.

15-21. Recovery of Waste Finish Materials. Herbert H. Watjen. *Industrial Finishing*, v. 20, May '44, pp. 64, 66.

General outline of some of the techniques that can be used to minimize the waste of finishes.

15-22. Battlefield Scrap. *Western Metals*, v. 2, May '44, pp. 33-34.

Policies have been determined for the full utilization of all salvage—both repairable property and scrap—plus any surplus army material, by seeing that it is channeled back into fields where needed.

16. FURNACES AND FUELS

16-59. What About the Future of the Combustion Gas Turbine? F. K. Fischer and C. A. Meyer. *Steel*, v. 114, May 1, '44, pp. 110, 154-155.

Advantages of the gas turbine cycle: No boiler is used; water is not required; promises greater efficiency improvement at high temperature; and high horsepower per pound output for short life applications.

16-60. Procedure Followed in Hearth Construction. H. O. Johnson. *Steel*, v. 114, May 8, '44, pp. 120, 123.

Construction of blast furnace hearth at plant in Pittsburgh district includes subhearth cooling facilities extending 6 ft. below regular hearth cooling plates. Details of hearth installation are presented. Combination primary and secondary gas washer designed to clean 18,000 cu. ft. of gas per min. provides fuel with cleanliness of 0.025 grain per cu. ft. for stoves lined with 2¾-in. checkers.

16-61. Blowing Rates of Various Blast Furnaces. E. L. Clair. *Iron and Steel Engineer*, v. 21, April '44, pp. 35-39.

Investigation of furnace data shows the relation between blast volume and stockline area to be practically constant over the entire range of furnace sizes, while the more commonly used relation between blast volume and hearth area varies widely.

16-62. Plate Mill Heating Furnaces. A. J. Fisher. *Iron and Steel Engineer*, v. 21, April '44, pp. PM 59-61, 63, 66.

Modern in-and-out furnaces designed and built by Bethlehem.

16-63. Pusher-Furnace Trays and Baskets Designed for Longer Life. W. A. Hakin. *American Machinist*, v. 88, April 27, '44, pp. 102-104.

These furnace accessories must eventually wear out, but their service life will be extended by observing known structural principles and approved foundry practice during their selection.

16-64. Radiant Heating for Industrial Processes. "Infra-Red" by Gas. L. W. Andrew and E. A. C. Chamberlain. *Engineers' Digest*, v. 1, April '44, pp. 289-292.

Convection versus radiant heating; suitable intensities of radiation; absorption of radiation; performance; air temperature between panels during operation.

16-65. Gas Flames: The Case for Aeration Entirely at the Point of Combustion. Dean Chandler. *Engineers' Digest*, v. 1, April '44, pp. 293-294.

Improvement in the flexibility of oven flames is limited more by the burners than by any other factor. Ovens can be designed more satisfactorily if non-aerated burners are used.

16-66. Importance of Proper Choice of Heat Exchanger Surface, Particularly in Power Plant Equipment. K. Jaroschek. *Engineers' Digest*, v. 1, April '44, pp. 302-304.

Heat transmission coefficients of heat exchangers.

16-67. A Graphite-Rod Resistance Type Melting Furnace. A. Kropf. *Engineers' Digest*, v. 1, April '44, p. 304.

Offers considerable advantages and capable of producing a steel in no way inferior to crucible steel made in the ordinary way.

16-68. Why Fuel Conservation Is Imperative From Now Until April, 1945. Davis M. DeBard. *Industry and Power*, v. 46. May '44, pp. 56-58.

This year we have no other choice but to save 25 million tons by the elimination of all coal waste. New charts show consumption pattern.

16-69. Gears Carburized in Electric Salt Bath Furnace at Yale & Towne Plant. Howard Linn Edsall. *Industrial Heating*, v. 11, May '44, pp. 704-706, 711-712, 714.

In order to avoid oxidation, the necessity for sand blasting, or distortion after heat treatment, the liquid carburizing method is preferred. A furnace of the immersed electrode (Ajax-Hultgren standard 65-kw. size with roller-type cover) is used.

16-70. Utilization of Fuel Gas in War Production: II. Roger W. Jackson. *Industrial Heating*, v. 11, May '44, pp. 726, 728, 730, 732, 734, 736.

Phases of production of war materials, with special reference to the utilization of gas-fired equipment in the manufacture of construction materials, armor plate, petroleum products, synthetic rubber, aerial bombs, etc. The design of gas burners to be used against considerable back pressures, notably in large car-type furnaces.

16-71. Relationships Between Bath Volume, Hearth Volume and Electric Load in Electric Melting Furnaces: II. Victor Paschkis. *Industrial Heating*, v. 11, May '44, pp. 738-740, 742.

The influence of such factors as size and shape, heat losses per unit time, spacing of electrodes, speed and uniformity of melting and metallurgical considerations on the choice of a particular type of electric furnace to meet a given set of operating conditions.

16-72. Refining and Deoxidizing Practice in Basic Electric Steel Furnaces. *Industrial Heating*, v. 11, May '44, pp. 752, 754.

Reasons for oxidation; method for the removal of FeO in the metal before slagging off; sources of hydrogen.

16-73. Recent Developments in Utilization of Gas in Industrial Furnaces. Carroll Cone. *Steel Processing*, v. 30, May '44, pp. 309-315.

Gas carburizing, gas pickling, flame impact heating, other innovations in heat treating, current and proposed developments, the challenge of the future.

16-74. Manteca Magnesium Plant Solves Furnace Difficulty. *Western Metals*, v. 2, May '44, pp. 68, 70.

Burner in a hot air high heat furnace installed by Natural Gas Equipment Co. in a Los Angeles plant. The head is the one used in the NGE 1000 series gas burner in oil country boilers—industrially known as the NGE No. 314.

16-75. Bending Time of Aircraft Spar Caps Reduced by Induction Heating. E. H. Plesset, J. R. Chadwick. *Automotive Industries*, v. 90. May 15, '44, pp. 20-21, 86.

Investigation by Douglas Aircraft Co. engineers of the possibility of heating spar cap billets quickly by an induction method reveals the complete feasibility of this method for achieving a uniform temperature of 350 to 400° F. within a few minutes in the region to be bent. in contrast to the gas furnace method which required two hours. A schematic diagram of the basic method.

16-76. Electrometallurgical Treatment of Ores. Charles Hart. American Iron and Steel Institute Advance Paper, May 25, '44, 14 pp.

Furnaces for production of ferro-alloys; processes for ferrosilicon, ferrochrome, ferrotungsten, ferromanganese and pig iron.

17. REFRACTORIES AND FURNACE MATERIALS

17-19. Redesign Increases Cyanide Pot Life. J. H. Greenberg. *Metal Progress*, v. 45, May '44, pp. 912-913.

Ferritrol 19C paint applied and baked into outside of pot, changing oil-fired burner to gas-fired and redesigning inside of pot, increases life from 600 to 1200 heat hours to 3000 to 4000.

17-20. Thermobloc Recuperators and Heat Exchangers. *Metallurgia*, v. 29, March '44, pp. 261-263.

Development of alloy steels, capable of withstanding relatively high temperatures, has facilitated the use of metallic recuperators and heat exchangers, but limitations have been imposed by their initial high cost. Incandescent Heat Co., Ltd., has developed an efficient type of metallic recuperator of small bulk and low first cost, known as the Patent Incandescent Thermobloc, which can be applied to a wide range of heating problems.

17-21. Low Loss Ceramics. R. Russell, Jr. and L. J. Berberich. *Electronics*, v. 17, May '44, pp. 136-142, 338.

Zircon porcelains widely used as insulation where ability to withstand heat-shock is important, such as in spark-plugs, have been developed for high-frequency use. Properties of such porcelains and of steatites, ultra-steatites, high-tension porcelain and transparent fused quartz are given. Test methods are described. 10 ref.

17-22. Steel Plant Refractory Problems. *Industrial Heating*, v. 11, May '44, pp. 794, 798, 800.

Problems encountered in the application and maintenance of refractories used in steel plants. Life of silica brick roofs used on open-hearth furnaces could be increased appreciably by the application of roof temperature control.

18. HEAT TREATMENT

18-92. Induction Heating Serves to Speed Production. M. P. Vore. *Product Engineering*, v. 15, March '44, pp. 182-184.

Basic principles of induction heating and the advantages of its use, including data on typical applications. Depth of penetration, frequency requirements and proper proportioning of heating coils are outlined.

18-93. Principles of Heat Treating of Steels. T. F. O'Brien. *Steel Processing*, v. 30, April '44, pp. 225-227, 250.

Fundamental chemical and physical aspects of the science of heat treating: heat treatment of steel; aircraft steels, and the problem engendered by the national emergency and the critical shortage of materials.

(Continued on page 9)

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Metal Literature Review—*Continued*

18. HEAT TREATMENT (*cont.*)

18-94. Aging and the Yield Point in Deep Drawing Steel Sheets. J. R. Low, Jr., and M. Gensamer. *Steel Processing*, v. 30, April '44, pp. 232-235, 243-245.
Influence of moisture content of gas mixture, temperature, specimen thickness. Wet heat treatment of other grades of steel; effect of heating in air following wet heat treatment; mechanical properties of heat treated sheets after cold rolling.

18-95. Exact Control of Heat Treatment Essential in Manufacture of Tube Cleaners. R. R. Stevenson. *Steel Processing*, v. 30, April '44, pp. 239-240.
Alloy carburizing steel used; heat treatment; furnaces; inspection.

18-96. Controlled Atmospheres for Heat Treating. III. C. E. Peck. *Steel Processing*, v. 30, April '44, pp. 241-243.
Lean monogas; rich monogas; ammogas; rich combusted ammogas; lean combusted ammogas.

18-97. Nitriding of Hardened High Speed Steel Tools. J. G. Morrison. *Steel Processing*, v. 30, April '44, pp. 247-250. 6 ref.
Liquid nitriding of high speed steels; a comparison of the several methods used.

18-98. Developments in the Water Quenching of Steel Castings. Charles W. Briggs. *Foundry*, v. 72, May '44, pp. 58-59, 132.
Quenching treatment of commercial castings will be the major steel casting development of the war.

18-99. Stress Relieving with a Welding Machine. Ray B. Foster. *Steel*, v. 114, May 8, '44, pp. 108, 110.
Detailed recommended practice and typical results obtainable by use of a standard 240-cycle alternating-current welding machine as power source for electric induction heating.

18-100. Tool Life Increased by Improved Annealing Procedure. James Sorenson. *Steel*, v. 114, May 8, '44, p. 114.
Comparison of effective tool life on a turning operation between two different annealing procedures applied to SAE 4340 steel.

18-101. "Soft Skin" on Highly Finished Surfaces. P. Leinweber. *Engineers' Digest*, v. 1, April '44, pp. 273-275.
Method and conditions of test; treatment of test specimens.

18-102. Technique for Spray Quench. Frank Miller and Ben F. Shepherd. *Metal Progress*, v. 45, May '44, p. 902.
Keep liquid running in spray quench almost up to time of quenching, then shut off the spray, blow off the excess liquid and when the hot piece is in place restart the spray.

18-103. Improved Processing Methods Help Avoid Heat-Treat Distortion. G. W. Birdsall. *Steel*, v. 114, May 15, '44, pp. 86-89, 134, 136, 138, 140, 142, 144.
Importance of incremental or step-by-step heating and cooling methods where distortion and warping are factors. New processes include austempering, martempering, and isothermal heat treatment.

18-104. Refrigeration Retards Age Hardening of Aluminum Alloys. F. Keller. *Heating and Ventilating*, v. 41, May '44, pp. 49-52.
Aluminum alloys, shortly after they have been heat treated, start to age or harden at room temperature. Riveting or bending becomes difficult. By storing the parts at cold temperatures, after the metal has been heat treated, the natural aging is retarded. The alloys remain workable over a longer period. Refrigeration has eliminated costly repetitions of heat treatment, and has speeded production in airplane plants.

18-105. Principles of Heat Treating of Steels. T. F. O'Brien. *Steel Processing*, v. 30, May '44, pp. 297-298, 323.
Solution, precipitation, recrystallization and grain growth, cooling and cooling rates, precautions, note on terminology.

18-106. Eliminating Cracking in Heavy Forging Dies. W. Haufe. *Iron Age*, v. 153, May 18, '44, pp. 66-71.
German suggestions for the proper handling of heavy drop forging dies during the hardening and tempering cycles.

18-107. Interpretation of Isothermal Transformation Diagrams for Steel: II. *Industrial Heating*, v. 11, May '44, pp.693-696, 698, 700, 702, 714.
Relationship of the curves to microstructure to be expected from a given treatment, and the complete explanation of a typical diagram. 34 ref.

18-108. Tools, Dies and General Work Handled by Metal Treating Inc. Plant in Milwaukee. *Industrial Heating*, v. 11, May '44, pp. 811-812, 814, 816, 818.
Equipped to handle tool and die hardening, carburizing, cyaniding, annealing, normalizing and general heat treating.

18-109. Heat-Treating Accessories Improve Labor Relations. *American Machinist*, v. 88, May 25, '44, pp. 109-110.
The Bren barrel is heat treated and roller-die quenched on a continuous basis. When stacked on skids, the "smoke" given off by the barrels was noxious to operators. This situation was overcome by design and installation of a "smoke ejector."

19. WORKING

Rolling, Drawing, Pressing, Forging

19-95. Unique Die Sets. G. Eldridge Stedman. *Steel*, v. 114, April 24, '44, pp. 106, 108, 132, 134.
Feature multiplicity of slides, cams, punches and the like to produce at one operation many complicated parts for electrical switchboards; permit vertical press to handle wide range of metalworking operations.

19-96. Charts Simplify Punch Press Loading. D. E. Hayes. *American Machinist*, v. 88, April 27, '44, pp. 108-110.
Quick reference form makes it easy to determine tonnage required for blanking. A chart listing press specifications is also used for proper loading.

19-97. 5000 Ton Press Turns Out 24,000 Aircraft Parts Daily. *Steel*, v. 114, May 1, '44, pp. 106, 108.
Average production of 24,000 aircraft parts every 24 hours from a 5000-ton hydraulic press equipped with four motorized loading carriages or tables which make the operation practically continuous.

19-98. Cast Kirksite Blanking Dies. *Iron Age*, v. 153, May 4, '44, pp. 56-59.
Cast zinc alloy dies are being used successfully with steel template blanking punches at North American Aviation, Inc. For temporary tooling, both halves of the set are screwed to universal die shoes. Pierce and blank template dies are made by casting Kirksite onto a keyed backing plate. This is a modification of the technique of making pierce, blank template dies out of tooled Kirksite.

19-99. Continuous Cold Drawing Machines. *Iron Age*, v. 153, May 4, '44, p. 66.
Basic principles and practices of cold drawing have been retained, but have been elaborated upon to obtain a continuous cycle in what has heretofore been an intermittent operation.

19-100. The Modern Plate Mill. *Iron and Steel Engineer*, v. 21, April '44, pp. PM 18-21.
Tables showing location, number of stands, type, roll drain and length, gauges, maximum width, annual capacity, drive-type, horse power and rpm; rpm of rolls.

19-101. Recent Plate Mill Developments. R. E. Noble. *Iron and Steel Engineer*, v. 21, April '44, pp. PM 23-47.
Production statistics, types of mills, component parts of the plate mill plants, 160-in. single stand mill with scale breaker; description of Steel Co., of Canada, Tennessee Coal, Iron, and Railroad Co., Kaiser Co., South Africa Iron and Steel Industries Corp., National Steel Co. of Brazil. 132-in. semi-continuous mill.

19-102. Plate Rolling Practice. Louis Bunting and T. T. Watson. *Iron and Steel Engineer*, v. 21, April '44, pp. PM 48-51, 71, 72, 75.
Mill description, practice, ingot provision, yields, descaling.

19-103. Observations on Plate Mill Rolls. Louis Moses. *Iron and Steel Engineer*, v. 21, April '44, pp. PM 54-56.
Study of roll spallage and the reasons therefor.

19-104. The Use of Carbides for Press Work. *Machine Tool Blue Book*, v. 40, May '44, pp. 155-156, 158, 160, 162, 164, 166.
Carbide's tremendously high abrasion resistance and consequent ability to hold close limits and maintain high finish, multiplies die life many times.

19-105. Forging Die Design. John Mueller. *Steel Processing*, v. 30, April '44, pp. 217-218.
"Die lock," what it is, how to design dies to take care of this factor and different points the designer must consider in laying out the die.

19-106. New Developments in Metals in Production of Stampings. *Steel Processing*, v. 30, April '44, pp. 219-221.
The economics of the use of stamped, drawn and pressed metal.

19-107. Stretch - Forming Double - Curved Sheet - Metal Parts. R. B. Glassco and N. O. Myklestad. *Steel Processing*, v. 30, April '44, pp. 222-224.
Mathematical development of forming of saddle-back part from sagging sheet.

19-108. Fabrication of Hollow Steel Propeller Blades. *Steel Processing*, v. 30, April '44, pp. 228-231, 243.
Fabricating hollow steel propeller blades is a difficult and intricate process. Each blade undergoes almost 100 separate operations in its manufacture, and inspection is very thorough to insure against failure in operation.

19-109. Forging Forks for Farmers. W. K. Cowdery. *Steel*, v. 114, May 8, '44, pp. 98-99, 106.
An unusual combination of hand and mechanical methods.

19-110. Hydraulic Device Improves Stretch Forming. *Aero Digest*, v. 45, April 15, '44, pp. 106, 108.
Forming aircraft metal parts by stretching them at the same time they are being bent to shape is being accomplished with a simple light machine consisting of a small rotatable table and hydraulic cylinder and piston mounted on a base.

19-111. Manipulation of Light Alloy Sections. J. Aherne Heron. *Engineers' Digest*, v. 1, April '44, pp. 279-280.
Current up-to-date methods employed for forming extruded light alloy sections for airframe construction include contour rolling, press-forming, and normal hand-forming over jigs.

19-112. Operating Economy of Pneumatic and Steam Forging Hammers. F. Knorr. *Engineers' Digest*, v. 1, April '44, pp. 287-288.
Factors which are decisive upon operating economy.

19-113. Design and Production Technique, III. A. J. Schroeder. *Aircraft Engineering*, v. 16, March '44, pp. 83-88.
Principles involved in punching.

19-114. Designing of "Trouble-Free" Dies. C. W. Hinman. *Modern Industrial Press*, v. 6, May '44, pp. 20, 22.
Miscellaneous dies and press equipment.

19-115. Economy in Blanking. Sergius D. Brootzkoos. *Modern Industrial Press*, v. 6, May '44, pp. 24, 26.
Sheet metal articles and parts are mostly stamped, formed or drawn from cut flat pieces of metal or blanks, as they are called by the trade. These blanks are either cut in a separate operation, or the blanking operation is combined with a drawing or a forming operation.

19-116. Goodyear Develops Machine to Speed Up Production of Metal Parts for Aircraft. *Modern Industrial Press*, v. 6, May '44, pp. 28-30.
Industry's need for quick, economical and large-scale production of metal parts has been met by a machine called a roto stretcher.

19-117. Draw Die Materials. Gordon B. Ashmead. *Modern Industrial Press*, v. 6, May '44, p. 32.
Draw dies are successfully made from wood or steel and a wide range of materials in between these two.

19-118. Designing Joggles for Sheet-Metal Assemblies. Frank M. Mallett. *Product Engineering*, v. 15, May '44, pp. 338-339.
Sheet-metal assemblies require fitting a member to two parallel surfaces not in the same plane; the forming necessary to make a proper fit is called joggling and the part is said to have a joggle. This makes a part more expensive, but if it results in better fits the saving in assembly expense more than makes up the increased cost of the part.

19-119. The Ancient Art of the Gold Beater. Joseph Danforth Little. *Metal Finishing*, v. 42, May '44, pp. 272-275.
History of the art.

(Continued on page 10)

Internal Mysteries of High Speed Heat Treat Clarified by Cohen

Reported by H. C. Amtsberg
Metallurgist, Westinghouse Electric & Mfg. Co

A great deal of the mystery of what really happens inside high speed steel during the complete heat treatment cycle was removed by Morris Cohen, associate professor of metallurgy, Massachusetts Institute of Technology, at the regular meeting of the Pittsburgh Chapter on April 13.

Quenched high speed steel, Dr. Cohen explained, contains tetragonal martensite, undissolved alloy carbides, and residual austenite (about 20% in an average treatment). The usual tempering of this structure involves three steps.

First, tempering of the martensite occurs, i. e., decomposition of the tetragonal martensite accompanied by the usual softening and volume decrease. Second, as the heating is continued, further tempering takes place with precipitation of alloy carbides, increasing hardness, and further decrease in volume. Third, on cooling from the tempering temperature, the retained austenite is transformed, with considerable expansion and a further increase in hardness.

Where cooling during the quench is interrupted because of practical consideration of the quenching hazard, the percentage of retained austenite will be correspondingly higher. This practice is quite satisfactory, however, if multiple tempering is employed.

The effect of various holding times at the tempering temperature was illustrated by mechanical property data. For 18-4-1 steel, tempered at 1050°F., optimum properties were obtained by double tempering, the first temper being for 2½ hr. Hot hardness, torsional impact, and transverse strength were all superior with insignificant sacrifice of room temperature hardness.

Dr. Cohen brought out some interesting points in connection with the much talked-of sub-zero treatments. He advised that —100° F. is low enough, this temperature leaving a structure of only 9% austenite. Temperatures down to —300° F. have little further effect. The time at the sub-atmospheric temperature is unimportant as long as the piece actually reaches the prescribed temperature.

Interrupting the cooling at room temperature during the quench, however, was shown to be very significant. If the time at room temperature exceeds as little as 6 min., the percentage of convertible retained austenite actually transformed begins to drop off. If the pieced is "aged" at room temperature for a number of hours, cooling to —300° F. will be only 26% efficient.

However, tools that have been completely heat treated and used for months, have shown increased life when given a sub-zero treatment. Thus, an "X" factor is introduced since the improvement cannot be explained solely on the basis of transformation of retained austenite.

U.S. Steel Names Davenport Assistant to Vice-President

EDMUND S. DAVENPORT has been appointed assistant to R. E. Zimmerman, vice-president, research and technology, United States Steel Corp. of Delaware. Joining the staff of the Corporation's Research Laboratory at Kearny, N. J. in 1929, Mr. Davenport since 1935 has supervised the work of the metallurgical section of that laboratory.

E. S. Davenport

Mr. Davenport's chief activities with the U. S. Steel Corp. have been studies of heat treatment problems particularly in connection with the isothermal transformation of steel, for which he was awarded the Robert W. Hunt Medal of the American Institute of Mining and Metallurgical Engineers in 1931. In 1939 he delivered the Campbell Memorial Lecture of the American Society for Metals.

He was graduated from Yale University in 1919 with the degree of Ph. B., and in 1921 received a Master of Science Degree in Metallurgy from the same school. For two years he conducted metallurgical research for Eastern Malleable Iron Co., and for seven years was at Westinghouse Lamp Co.

Metal Literature Review

19. WORKING (*cont.*)

19-120. Mass Production Metal-Forms. Fred P. Peters. *Scientific American*, v. 170, May '44, pp. 199-201, 235.

In materials engineering, the choice of metal-form or fabricating method is often as important as selecting the metal to be used. Process-competition in the small-parts field is especially intense and will become more so in the not far distant future.

19-121. Salvaging Mandrels. G. H. Henshaw. *Steel*, v. 114, May 15, '44, pp. 108, 111.

Willys-Overland rebuilds worn equipment by spraying with metal and grinding to proper size, saving 20 cents per shell.

19-122. Western Cartridge Co.'s New Brass Mill Features Straight Line Production. G. Eldridge Stedman. *Steel*, v. 114, May 15, '44, pp. 114-116, 118.

Prior to hot rolling, the slabs are heated in gas-fired pusher-type furnaces. After hot rolling, the material is passed through a 9-roll straightener; next through a slab miller to remove possible surface defects; then turned over and passed through a second miller to treat the other side. The material then is ready for the tandem mill. Tandem mill cold reduces the semi-finished material in two passes.

19-123. What the Product Designer Should Know About Hot-Heading. A. E. R. Peterka. *Machinery*, v. 50, May '44, pp. 172-177.

Sizes adapted for hot heading, relative cost of hot and cold heading dies a governing factor, advantages and limitations of cold and hot heading.

19-124. Shrink-Fit Assembly of Cylinders Is Done on a Special Press. *American Machinist*, v. 88, May 11, '44, pp. 101-102.

Uniform results in assembly of Allison cylinder banks arises from use of a hydraulic press that simultaneously pushes six refrigerated steel barrels into a heated aluminum head casting.

19-125. Novel Methods Speed Manufacture of M3 Submachine Gun. *American Machinist*, v. 88, May 11, '44, pp. 109-116.

Weapon is fabricated almost entirely of stampings and screw machine parts at the Guide Lamp Division of General Motors. Barrels are made from seamless tubing and rifling grooves are formed by a press operation.

19-126. Device for Calculating Wire Mill Problems. E. H. Webb. *Wire and Wire Products*, v. 19, May '44, pp. 291-293.

Calculator used in connection with a new wire gage, based on the equal reduction in sectional area between each wire gage number.

19-127. Cold Rolling of Narrow Strip and Its Equipment Requirements. R. J. Wean. *Wire & Wire Products*, v. 19, May '44, pp. 295-298, 317.

Historical data furnished by the Broden Construction Co.

19-128. Glass Processing Wire and Steel Products. John J. Caugherty. *Wire and Wire Products*, v. 19, May '44, pp. 299-303.

Methods to eliminate the use of acids in cleaning methods, improve the quality, increase production, at reduced costs, and save in metal loss. The new methods cover hot rolling, cold drawing, galvanizing, and heat treatments, such as annealing, patenting, etc., with de-oxidation in one continuous operation.

19-129. Supervisory Control for the World's Most Modern Steel Mill. P. B. Garrett and M. E. Reagan. *Electrical Engineering*, v. 63, May '44, pp. 259-264.

Details of operation; transfer switches; control lines; supervisory versus direct-wire control; motor-room control; regulator control for the structural-steel mill; no-alarm feature; miscellaneous supervision features; rectifier control; rectifier protection, step-regulator control; tie substation alarm features; pilot channel supervision; door-lock supervision; blackout.

19-130. How to Wrinkle-Bend Non-Ferrous Pipe & Tube. I. *Industry & Welding*, v. 17, May '44, pp. 51-54, 56.

Method and advantages of wrinkle-bending copper and brass pipe.

19-131. Bar Mill Gives to Copperweld Steel Company Greater Flexibility of Operation. Charles Longenecker. *Blast Furnace & Steel Plant*, v. 32, May '44, pp. 547-550.

Bloom conditioning, the furnace, the 21-24-in. mill, finishing department.

19-132. Magnesium Sheet Easily Formed When Simple Precautions Are Observed. W. G. Harvey and J. B. West. *American Machinist*, v. 88, May 25, '44, pp. 105-108.

The factors that affect workability of magnesium alloy sheet are: Magnesium alloys must be heated to withstand severe bends, deep drawing, spinning, and other relatively difficult forming operations; thin sheet, heated for forming, may cool rapidly during forming; in many cases, when cold forming magnesium alloys, greater spring-back may be experienced than with aluminum; the capacity of magnesium alloys for cold working is far less than that for comparable aluminum alloys.

19-133. Deep Drawing of Formed Parts for Flying Fortresses. B. K. B. *Machinery* (London), v. 64, April 6, '44, pp. 365-369.

Use of deep-drawing dies for shaping formed parts required in the construction of airplanes. Resumé of handicaps encouraged, maintenance of shape; die design.

19-134. Ordnance Components Mass-Produced by Pressed-Metal Technique. C. F. Greeves-Carpenter. *Machinery* (London), v. 64, April 6, '44, pp. 380-381.

Developments in the pressed-metal industry point the way for new designs, better construction and lower cost products in post-war production.

19-135. Tools for Producing a Sheet Steel Pressing. W. Danks. *Machinery* (London), v. 64, April 6, '44, pp. 382-384.

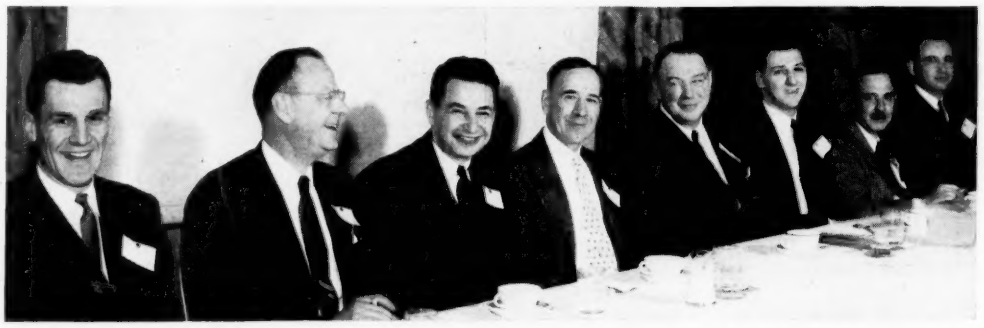
Lock pressing from 3/32-in. steel sheet, pierced to suit an opposite part with which it has subsequently to be assembled, and bent up to a shallow channel form produced accurately and economically in two simple press operations, by first piercing and chopping off, and by subsequently bending to form.

19-136. Forming of Magnesium Alloys. Paul Hawley. *Western Metals*, v. 2, May '44, pp. 28-29.

Use of magnesium alloys in the design of aircraft structure and forming of sheet magnesium alloy.

(Continued on page 11)

Dinner Opens Regional Meeting of Five Chapters



At the Speakers' Table for the Regional Meeting of the Syracuse, Buffalo, Rochester, Southern Tier and Schenectady Chapters A.S.M., May 5 and 6, are, Left to Right: Lloyd Marshall of Delco Appliance Div., Speaker on Saturday; Howard Stagg; Peter Payson, Crucible Steel Co. of America, Speaker for the Friday Evening Technical Session; C. T. Patterson, Chairman of the Session; D. R. MacAllister, General Chairman of the Sponsoring Committee; Robert Shattuck, Syracuse Chapter Chairman; E. G. White, Vice-Chairman; and Karl Robertson, Treasurer.

Five Speakers Address Two-Day Regional Meeting

Five authorities from as many fields in the metal industry discussed their specialties during the two-day regional meeting of the upper New York chapters of the American Society for Metals. The meeting was held in Syracuse on May 5 and 6 and was sponsored by the Syracuse, Buffalo, Rochester, Southern Tier and Schenectady Chapters.

The meeting opened Friday evening with a dinner at the Onondaga Hotel followed by a technical session addressed by Peter Payson, assistant director of research, Crucible Steel Co. of America, on "Annealing of Steel."

Morning and afternoon technical sessions were held on Saturday. R. N. Gillmor, metallurgist, General Electric Co. Turbine Plant, Syracuse, gave some off-the-record facts on turbine steels, and Harry W. McQuaid, assistant chief metallurgist, Republic Steel Corp., spoke on "Recent Advances in Metallurgy."

"Experiments With High Speed Steels" was the subject discussed by Lloyd Marshall of the Delco Appliance Division of General Motors Corp., and Fay F. Adkinson of Syracuse Heat Treating Co. spoke on "Present and Post-War Steels."

Over 200 registered for the two-day session. D. R. MacAllister of Syracuse Heat Treating Co. was general chairman of the sponsoring committee.

Boron Additions Most Useful In 0.20 to 0.50% Carbon Steels

Reported by A. Floyd Whalen
Metallurgist, Harrisburg Steel Corp.

The story of the development of boron in cast iron and steel completed the lecture season of the York Chapter A.S.M. on April 12. Norman F. Tisdale of Molybdenum Corp. of America captured his audience by discarding notes and describing in a conversational manner the long and painstaking work with boron additions. A few highlights of his talk follow:

Boron causes no change in the critical point and consequently no change in the heat treatment.

It will coarsen the grain size one point; consequently more aluminum is needed in steel making.

Low drawing temperature increases the impact value.

In small amounts it has very little effect upon steels above 0.85% carbon, and is not often used in steels below 0.10% carbon; its greatest value is in steels between 0.20 and 0.50% carbon; 4140 so far has been the greatest user of boron.

Any steel that gives enough hardness penetration to produce the result desired should not use boron; only steels that do not harden sufficiently should employ it.

Pennington Joins Carrier Research Staff

Carrier Corp., Syracuse, N. Y., has announced the addition of WILLIAM A. PENNINGTON to the research staff of its Engineering Division. Dr. Pennington, a member of the A.S.M., will devote himself to Carrier's metallurgical and chemical problems.

Dr. Pennington, who has a B.S. in chemistry from Union University, and a Ph.D. from Iowa State, joined the research department of the American Rolling Mill Co. in 1933, where he helped develop corrosion resistant materials. This research brought him to the attention of the Mellon Institute, Pittsburgh, which offered him a fellowship to specialize in the field of physical chemistry as applied to metallurgy developments. Four years at the Institute were climaxed by his new association with Carrier.

Steel Quality Control Forced by Complexity Of Fabrication and Use

Reported by J. Ernest Hill
Metallurgist, Fairfield Tin Mill, Tennessee Coal, Iron & R. R. Co.

Several interesting sidelights on the early history of steel making and the outgrowth of brand names for steels of various localities, introduced a talk on "Control of Steel Quality" by Robert S. Archer, assistant to vice-president, Climax Molybdenum Co., at a meeting of the Birmingham District Chapter A.S.M.

The properties of these steels varied widely because of the difference in local ores. When bessemer steel appeared on the market, it proved to be the first real step toward uniformity in steels.

However, as the capacity for steel production increased and the market began to stabilize itself the necessity for better control in steel making became evident. The chemists were the first to enter the services of the steel maker in an effort to produce a better product and supply the customer with a steel which would better fit his needs.

Function of Contact Metallurgist

As the demands on the fabrication and uses of steel became more complex, inspectors, engineers, metallurgical testers in many specialized fields, metallurgical observers and customer contact metallurgists were employed. Specifications began to appear and to grow as the customer began to tell the producer just what he wanted in each item of steel ordered.

When the contact metallurgist can see the fabrication of the steel and talk to the customer about what is expected of the article being produced, he is then better equipped to advise his mills on the kind of steel to furnish. The two chief means employed by the mill to assure quality steel are close observation and inspection in processing, and sufficient metallurgical testing of the finished product.

Chicago Wheel Elects President

ARTHUR J. MILLER has been elected president of the Chicago Wheel & Manufacturing Co., producers of mounted wheels, grinding wheels and allied abrasive products. He replaces his father, the late Henry E. Miller who founded the company in 1894.

A. J. Miller

In 1915 Arthur Miller joined the company in the special formula department, and in 1926 was elected treasurer. He is responsible for many developments, including industrial type mounted wheels, high speed electric grinders and various processes widely used throughout the abrasive industry.

Bethlehem Casts Largest Ingot Mold

Probably the largest and heaviest single piece iron ingot mold ever made was recently cast in the iron foundry of the Bethlehem Steel Co.

A corrugated one-piece ingot mold weighing 200 tons, it was 9 ft. 3 in. wide, 16 ft. 7 in. long and 13 ft. 9 in deep outside; 5 ft. 6 in. wide, 12 ft. 10 in. long, and 13 ft. 9 in. deep on the inside, which gives a wall thickness of 1 ft. 10½ in.

Details of molding and pouring practice are given in *The Foundry*, May 1944, page 70.

Aircraft Industry Develops Strain Hardened Al Alloys

Reported by R. L. Rickett
United States Steel Corp., Research Laboratory

With J. B. Johnson of Wright Field as speaker, B. Clements of Wright Aeronautical Corp. as technical chairman, and an interesting exhibit of aircraft parts, April 17th was truly aircraft materials night for the New Jersey Chapter.

According to Mr. Johnson, who spoke on "Aircraft Equipment and Materials of Construction," the aircraft materials engineer is in a fortunate position since he is concerned primarily with the suitability of a material for a particular application and less with economic factors such as availability and cost. This has led to the development of rather expensive strain hardening and age hardening aluminum alloys, some of which have rather remarkable properties.

The strength of aged alloys of the duralumin type may be further increased by straining them, after aging, then heating the material to approximately 375° F., the speaker explained. Still higher strength, up to 70,000 psi. yield, may be developed in some of the newer quaternary alloys.

Disadvantages of using cold rolled or heat treated steel sheet are the likelihood of rusting, low ductility at high strength, and the difficulty of designing sufficiently rigid members when using extremely thin sheet.

Magnesium alloys in sheet form offer a theoretical saving in weight of 2 to 3% over aluminum but this saving has not been realized in practice. Magnesium alloy forgings have been substituted for aluminum forgings with advantage in those applications where the latter were understressed or where the thicker sections possible in magnesium alloy parts improved the structural rigidity. Castings of magnesium alloys can be made with the same strength as aluminum castings and may be advantageously substituted for them.

Common methods of testing corrosion resistance of aircraft materials are the salt spray test and alternate immersion in sea water. Intergranular corrosion may not be evident on the surface but can be detected by a reverse bend test. A laboratory test for susceptibility to intergranular corrosion consists of immersion in a 2% sodium chloride solution to which hydrogen peroxide is added. The ultimate test is exposure on tidewater racks in warm coastal waters.

American Steel & Wire Co. Names Smith Asst. Mgr. Metallurgical Dept.

Announcement of the appointment of H. H. SMITH as assistant manager, metallurgical department, has been made by the American Steel & Wire Co., Cleveland. Mr. Smith, a member of the Pittsburgh Chapter A.S.M., replaces the late Lawrence H. Dunham.

Mr. Smith first became associated with the Wire Company in 1928, when he was employed as a laboratorian at Donora, Pa. Four years later he was promoted to metallurgist and in 1936 was transferred to the Pittsburgh district office. In 1940 he returned to Donora as works metallurgist, a position which will now be filled by R. A. WOODSIDE.

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Metal Literature Review—*Continued*

19. WORKING (*cont.*)

19-137. Spinning Metals for Better, Cheaper Products. *Modern Industry*, v. 7, May 15, '44, pp. 76, 79-80, 83.
Metals now spun successfully include aluminum and aluminum alloys, magnesium, brass, bronze, copper, steel and steel alloys, nickel and nickel alloys, lead, pewter and zinc. Others, not so commonly used, are gold, silver, platinum, kovar, invar, and illium.

19-138. Forging and Fabricating 1000-Pound Semi-Armor Piercing Bomb. Gerald Eldridge Stedman. *Steel Processing*, v. 30, May '44, pp. 285-288, 324.
Method of making 1000-lb. semi-armor piercing bombs at plant of Darby Corp., Kansas City. The sequence of operations in processing these bombs together with background information on this company as to what can be expected from it in the future industrial expansion of this area.

19-139. Processing Steel Shells. C. W. Hinman. *Steel Processing*, v. 30, May '44, pp. 292-294.
A combination blank and draw die, piercing the circle of holes, peculiar advantages of the die, the piercing die in operation.

19-140. Contoured Cavity Method of Forging Large Shells. *Steel Processing*, v. 30, May '44, pp. 295-296.
Description and advantages of the new method.

19-141. Aging and the Yield Point in Deep Drawing Steel Sheets. J. R. Low and M. Gensamer. *Steel Processing*, v. 30, May '44, pp. 302-306.
Experiments to determine which of the commonly suspected elements is responsible for aging or the yield point by putting carbon, nitrogen and oxygen back into hydrogen-treated sheets and determining whether or not aging and the yield point reappear, arranging the experiment to ensure the introduction of only one element at a time.

19-142. Automatic Precision Taper Rolling. John W. Smith. *Steel*, v. 114, May 22, '44, pp. 90, 92.
Automatic precision die rolling for propeller blades.

19-143. Wire Rope. G. Eldridge Stedman. *Steel*, v. 114, May 22, '44, pp. 104-106, 108, 111.
Life of wire rope is influenced by many factors. Abuses to which it is subjected during installation create hazards. Steps involved in drawing and stranding wire and in closing strands into rope.

19-144. Roll More Tons—VII. A. E. Lendl. *Iron & Steel*, v. 17, April '44, pp. 313-318.
Calibrations of flat-bottom rail sections.

19-145. Tubular Railway Axles. *Iron & Steel*, v. 17, April '44, pp. 343-344.
Pilger process forging, finishing operations, large weight saving, less rail hammer.

19-146. Header Manufacture. *Iron & Steel*, v. 17, April '44, pp. 345-346.
Recent improvements in heating and forging.

19-147. Contour Forming of Extrusions and Preformed Sections by Stretching. Jack Johnson. *Automotive Industries*, v. 90, May 15, '44, pp. 22-25, 214.
The stretch forming of airplane parts to contour is a forming method which, while greatly simplifying the making of parts often difficult to form by other methods, entails relatively little tooling cost.

19-148. Designing Sheet-Metal Parts for Production. Frank M. Mallett. *Machine Design*, v. 16, May '44, pp. 103-108.
Formability of the sheet-metal parts for the airplane. Possible deformation affected by tools; forming of beads for stiffening. 16 ref.

19-149. Deep Drawing a Wide Flanged Cylindrical Shell. Eugene E. James. *Modern Industrial Press*, v. 6, May '44, pp. 37-38, 40.
Estimates given on the cost of draw dies to be amortized over the scheduled number of parts versus present metal spinning method. As a result of these estimates the dies were ordered, designed and built.

20. MACHINING AND MACHINE TOOLS

20-151. Points to Watch in Drill Jig Design. C. W. Hinman. *American Machinist*, v. 88, April 27, '44, p. 105.
Body construction, strength, pack case hardening, clearing jig handles, easy handling, location of hinge pins, equalizers, work supports, relation of work piece to the drill, feet, bushings, drill burrs, cleaning jigs.

20-152. Practical Ideas. *American Machinist*, v. 88, April 27, '44, pp. 111-116.
Rollers speed sawing of aluminum sheet. Fixture speeds inspection of rollers. Precision rings made in pairs. Simplified method of cutting magnesium. Sander removes box markings. Magnetic guide aligns tap. S-hooks formed by bench fixture. Reducing tap breakage. Fixed caliper arms for turning shouldered shafts. Slot checked with flush-pin gage. Quick action lid for drill jigs.

20-153. High-Speed Steel Tipped Tools and Tool Grinding. James Farmer. *Machinery* (London), v. 64, March 16, '44, pp. 287-290.
The butt-welded tool, the brazed or tipped tool, preparation of the tips, re-conditioning roller-type milling cutters.

20-154. Effect of Tooth Clearance on Milling-Cutter Performance. S.C.B. *Machinery* (London), v. 64, March 16, '44, pp. 291-293.
Too small a clearance angle and too wide a land, combined with too fast a feed relative to the cutter speed. may cause work-hardening of the piece being milled.

20-155. Securing Fine Surfaces by Grinding. H. G. Wills. *Machinery* (London), v. 64, March 16, '44, pp. 294-296.
Dressing tools, diamond dressing tools, holding the diamond in the tool, dressers or dressing tools with several diamonds.

20-156. Hints on Multple Tool Steel Turning With Carbides on Tomorrow's Machines. Ralph Granzow. *Machine Tool Blue Book*, v. 40, May '44, pp. 174, 176, 178, 180, 182, 184.
To meet increased production demands in the manufacture of war equipment, use of carbides on multiple tool set-ups for the turning of steel. Shell turning lathes—equipped with motors having horsepower ratings of 50, 75, and even as high as 100 to obtain the maximum rate of metal removal.

20-157. Roughing with Carbides. W. L. Kennicott. *Machine Tool Blue Book*, v. 40, May '44, pp. 277-278, 280, 282.
Overall efficiency of operation, considering life of the tools, grinding time and down-time of the machine, is better at lower speeds with positive angles and at higher speeds with negative angles.

20-158. Fewer Cutter Teeth Improves High Speed Steel Milling. Fred W. Lucht. *Machine Tool Blue Book*, v. 40, May '44, pp. 287-288, 290-292.
Tests demonstrate that by reducing number of cutting teeth and maintaining speed, production is increased.

20-159. Sulphurized Cutting Oils. A. F. Brewer. *Steel*, v. 114, May 1, '44, pp. 104-105, 141-142, 144, 146, 148.
No cure-all for machining difficulties but find wide usage where better heat transfer, more rapid cutting and smoother surface finish are important factors.

20-160. Machining Cylinder Fins. *Aircraft Production*, v. 6, April '44, pp. 155-156.
Special-purpose maxicut lathe for aero-engine work.

20-161. Machining 57-Mm. Anti-Tank Gun Barrels. *Machinery*, v. 64, March 23, '44, pp. 309-314.
Straightening is very important during the manufacture of gun barrels, and is performed four times during the finishing operations. Taper boring cuts on the powder chamber are performed on a turret lathe. Tapered and straight grinding cuts are taken on the powder chamber by a chucking grinder. Gun barrels are rifled by employing 25 disc-like broaches.

20-162. Industrial Diamonds. F. G. Rockwell. *Mining and Metallurgy*, v. 25, May '44, pp. 257-259.
Cemented carbides and synthetic abrasives are exceedingly hard, and have found wide use, but the diamond will scratch any of them. This property has made it invaluable in fine sizes for grinding and polishing, and as coarser stones for drilling, machining, shaping, and as dies for wire drawing. Much of our super war equipment would have suffered greatly in quality if we had not had large stocks of diamonds, and if we could not get more from Africa. Our requirements for this type of material have increased enormously.

20-163. Applying Carbide Tools on Automatic Screw Machines. Otto Guttman. *Iron Age*, v. 153, May 4, '44, pp. 62-66.
Taking as an example the tooling of an eight spindle automatic for 20-mm. tracer shells, shows that in order to safely employ the higher peripheral speeds required for turning with carbide form tools, smaller H.S.S. drills must be selected for the initial boring operations. The cavity is subsequently brought to size with a carbide gun drill and a carbide reamer. Some unconventional tool forms are illustrated.

20-164. Temperature Distribution in Lathe Cutting Tools. G. Pahlitsch and H. Helmerdig. *Engineers' Digest*, v. 1, April '44, pp. 283-287.
Application of the incremental method to a lathe cutting tool; thermodynamic fundamentals; determination of the increment scale; thermal considerations; the amount of heat absorbed by the tool.

20-165. X-rays and Industrial Diamonds. E. J. Tunnicliffe. *Engineers' Digest*, v. 1, April '44, pp. 292-293.
By examining every tool by X-rays, unsatisfactory settings may be easily discovered and the diamond remounted. In addition, the size and shape of mounted diamonds may be determined when the question arises of resetting worn, damaged or incorrectly set stones.

20-166. Engineered for Machining, II. John R. Ehrbar. *Die Casting*, v. 2, May '44, pp. 27, 29-30.
Each step in machining a die cast part is described in detail—assuming the use of simple machine tools available in almost any plant. Obviously, many of the operations could be simpler with a complete setup of machine tools and equipment.

20-167. High-Speed Milling with Negative Rake Angles. Hans Ernst. *Mechanical Engineering*, v. 66, May '44, pp. 295-299.
New procedure in the milling of steel, viz., the utilization of sintered-carbide cutters, with negative rake angles, operated at cutting speeds appreciably higher than formerly thought practicable even with these exceedingly hard cutting materials.

20-168. Determining Tool Efficiency in High-Speed Milling. Wallace E. Brainard. *Mechanical Engineering*, v. 66, May '44, pp. 301-302.
Development of a simple and accurate method of comparing and evaluating various designs of high-speed milling cutters, measuring loads directly at the cutter and equating these in terms of material removed. The cutter holder is treated as a beam, and a strain gage is used to measure applied loads.

20-169. Two Examples of High-Speed Milling. F. W. Lucht. *Mechanical Engineering*, v. 66, May '44, pp. 303-304.
Two methods for improving the operating conditions for a given job. In one case, the cutter had too many teeth, and a reduction in the number of teeth increased the chip load and improved the operating conditions. In the other case, the number of teeth was reduced to one, in order to keep within the power available, to eliminate a grinding bottleneck, to increase the chip load, and to improve the operating conditions.

20-170. Why High-Speed Milling? Wallace E. Brainard. *Tool Engineer*, v. 13, May '44, pp. 67-71.
Conventional milling equipment cannot take full advantage of the machinability of aluminum alloys. A redesigned machine and advanced methods of determining tool efficiency permitted applying speeds and feeds far beyond accepted practice.

(Continued on page 12)

Five of Original Chapter Organizers Celebrate Anniversary

Present officers are pictured with five of the original organizers of the Rochester Chapter at the Silver Anniversary and Fourth Annual Ladies Nite Dinner Dance. Reading left to right they are: Chairman E. N. Van Billiard, Secretary-Treasurer E. L. Spanagel, Ralph C. Schwartz, L. K. Marshall, Leon C. Slade, J. J. Desmond, Frank McDonald.

Rochester Chapter Grows From 34 to 294 Members in 25 Years

Reported by A. E. Schlaerth
District Sales Manager, Peter A. Frasse & Co.

Rochester Chapter A. S. M. celebrated its 25th anniversary at the Fourth Annual Ladies' Nite Dinner Party on April 15.

With an enrollment of 34 original members, the Rochester Chapter called its first meeting 25 years ago. National Secretary Bill Eisenman addressed this meeting, using as his keynote speech "Heat Treating from 1200 B. C." The chapter membership has increased rapidly, until at present it totals 294.

Capt. Holden Resigns, Returns to N. Y.

CAPT. T. N. HOLDEN of the Washington Ordnance District has retired from the Army and been placed on inactive status, subject to call when his services are required again. He has returned to his former business as sales representative at 233 Broadway, New York.

Captain Holden was secretary-treasurer of the New York Chapter A.S.M. for 22 years until he was forced to resign a year ago when he was transferred to Washington.

Shot Blasting and Rolling to Produce Stressed Surfaces Described

Reported by H. P. Henderson
Prod. Engr., New Departure Div., G.M.C.

Using annealed and air quenched glass panels as an example, J. O. Almen demonstrated at the May meeting of the Hartford chapter A.S.M. how stress relief may damage or help the strength of materials in service. Mr. Almen, who is head of Mechanical Engineering Department 1 of the Research Laboratories Division of General Motors Corp., spoke on "The Effect of Residual Stresses on the Strength of Metals."

Mr. Almen's talk has been previously reported in THE REVIEW when presented before other chapters of the Society. He discussed methods of checking and analyzing stresses, surface fractures resulting from grinding, and use of shot blasting, rolling and other methods of mechanically producing compressive surface stresses.

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Employment Service Bureau

Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, Ohio, unless otherwise stated. Applicants for the positions listed below are required to observe the rules and regulations of the War Manpower Commission regarding a Statement of Availability, if employed in an essential activity.

Positions Open

SKILLED OR UNSKILLED MEN: Old established firm making and machining steel castings for over 35 years offers splendid opportunity in steel foundries and machine shops, located in Ohio. Should be over draft age or not subject to induction. Needed in all departments including melting (electric furnace), molding, heat treating, roll department, cleaning room, pattern shop, and laboratory. Also supervisors for all departments. Write or apply to The Ohio Steel Foundry Co., Lima, Ohio or Springfield, Ohio.

ANALYTICAL CHEMIST: With experience in analysis of metallurgical products, for eastern alloy manufacturing company. State full qualifications in first letter. Box 6-5.

PHYSICAL METALLURGIST-METALLOGRAPHIST: Experienced in ferrous and non-ferrous metals. Permanent position with an eastern independent commercial and development organization. State education, experience, and salary expected. Box 6-10.

METALLURGICAL CHEMIST: Familiar with both ferrous and non-ferrous analysis. Also some experience in plating solution control. Knowledge of shop control and materials desirable. The Amertorp Corp., 7500 W. Roosevelt Rd., Forest Park, Ill.

CHEMIST: Experienced on ferrous and non-ferrous analysis. Important war work and excellent post-war future. State experience, references, age, salary. Letters strictly confidential. Box 6-35.

SALES AND ENGINEERING OPPORTUNITIES: Men with engineering background in metal working or automotive fields for a well-established, nationally known manufacturer and distributor of industrial oils. Excellent postwar prospects. Write an informative letter to Box 6-40.

SALES AGENTS OR DISTRIBUTORS: Experienced in selling electric furnaces to industrial research laboratories, colleges, manufacturing plants in New England states and on the West Coast. This is an established electric furnace line backed by national advertising and has a wide market in radio, ceramic, chemical, metal and other industries. Will contract with agents or distributors of lines non-competitive to electric furnaces. Box 6-60.

RESEARCH ENGINEER: Top-flight, with excellent executive ability. Metallurgical or chemical engineer or physicist, with field experience in heat treatment of ferrous and non-ferrous metals. Five to 15 years' experience; age 30 to 40. Salary $5,000 to $10,000. Box 6-45.

ADD TO POSITIONS WANTED:

Positions Wanted

METALLURGICAL ENGINEER: PH.D., over 25 years' diversified technical experience. Desires connection as chief metallurgist or director of research and development. Thorough knowledge application, fabrication and heat treatment stainless and alloy steels. Recent experience includes design and organization of metallurgical laboratory and department functioning in specification of materials for important ordnance product. Post-war future and eastern location desired. Box 6-15.

POWDER METALLURGIST: Graduate metallurgical engineer; ten years' experience in research and production of powdered metal products. Desires connection with aggressive organization. Box 6-20.

SALES ENGINEER: Heat resisting alloys. Age 38; 15 years' experience in foundry manufacture, drafting room, design and sales among automotive trade. Would like position with reliable company combining sales and engineering experience, or will furnish own designs and drawings on straight sales work. Michigan location preferred. Box 6-25.

HEAT TREAT SUPERVISOR or TROUBLE SHOOTER: Age 38; 17 years' experience in heat treating large forgings, such as gears, pinions and shafting. Installed and took charge of carbottom, oil fired, electric pit type, box type gas fired, and L-N gas carburizer. Box 6-30.

METALLURGICAL CHEMIST: Chemical engineer, B.S.; 14 years' experience in power plant, water plant, automotive and plane parts plants. Familiar with both ferrous and non-ferrous analysis, plating solutions, heat treat and testing of materials. Must be on West Coast. Box 6-50.

SALES MANAGER: 25 years as sales representative and district manager special steel industry. Thorough knowledge all specifications and uses. Seeking responsible position as district manager or assistant to general sales manager. Box 6-55.

Metal Literature Review

20. MACHINING (*cont.*)

20-171. Three Applications of Electronic Drive to Lathes and Milling Machines. B. T. Anderson. *Tool Engineer*, v. 13, May '44, pp. 86-88.

For machining a spiral groove, production engineers selected an automatic lathe with electronic drive. Cam mounted on back of face plate guides rear tool slide. Electronic control provides constant surface speed at the tool, and rapid return.

20-172. Electronic Control Applied to Grinding Machines. R. A. Cole. *Tool Engineer*, v. 13, May '44, pp. 89-90.

To apply an electronically controlled, adjustable-speed motor to the grinding machine, consideration must be given the elements of the machine and the types of controls required. Types of drive units, hydraulic motors, grinder requirements, six advantages, motor-generator sets, wide speed range, optimum capacity.

20-173. Broaching Fundamentals and Application. Arthur Burgan. *Tool Engineer*, v. 13, May '44, pp. 91-94.

Round-hole broaching, broaching irregular shapes, chip breakers, surface broaching, broach maintenance, broach sharpening, automatic broach puller.

20-174. Carbides: Something New in Taps. Wallace Scotten. *Tool Engineer*, v. 13, May '44, pp. 101-102, 105.

Foreshadowing wider utilization of carbides in taps is the successful application of the material in a tool now produced for an aircraft engine job.

20-175. Grinding to Ten-Thousandths Inch on a High-Production Basis. Ralph Price. *Machinery*, v. 50, May '44, pp. 158-161.

Methods and equipment used for high-production grinding of work that is held to size within tenths of a thousandth of an inch.

20-176. Faster Tool Grinding With Cup-Wheels. R. D. P. *Machinery* (London), v. 64, March 30, '44, pp. 345-346.

Grinding on the face of a cup-wheel gives a flat clearance, not under-cut.

20-177. High Speed Precision Tapping Requires Proper Choice of Equipment. Herman Goldberg. *American Machinist*, v. 88, May 11, '44, pp. 94-96.

Pertinent facts to get optimum results and maintain high production.

20-178. Practical Ideas. *American Machinist*, v. 88, May 11, '44, pp. 103-108.

Tandem die for piercing angle plates. Swedging tool flares large copper pipe. Adjustable lathe stop speeds boring operation. Feed magazine built for tapping lathe. Knife sharpener removes templet burrs. Air valve ejects parts from drill jig. Guide light on shears speeds production. Form cutter made with inserted teeth. Press jig spaces holes in angle iron. Roller bearing replaces bronze arbor bushing.

20-179. Westinghouse Machine Tool Forum Attracts Biggest Attendance. *Iron Age*, v. 153, May 11, '44, pp. 78-81.

Electronic tracer mechanism, electrical shortcomings, to buy or build, electrical standards, mechanical data, carbide steel milling, future of industry.

20-180. Signs and Portents of New Era for Machine Tools. Guy Hubbard. *Steel*, v. 114, May 15, '44, pp. 92, 94.

Need for further standardization of machine tools; need for speeds and feeds; electric control; present emergency finish on machine tools; standard color used on machine tools; accuracy and work finish; chip disposal; lubricating facilities on machine tools; and electric control.

20-181. Faces Motor Base With Flycutter. *Steel*, v. 114, May 15, '44, p. 96.

Electrical manufacturer reverses cardinal rule of machine shop practice, adapting flycutter attachment which takes tool to the work. Setup simplifies production, utilizes break-in run of motor for power to drive tool.

20-182. How to Use Roller Turner Tools. R. D. Mack. *Western Metals*, v. 2, May '44, pp. 40, 42-43.

Setting of tool and roll, speeds and feeds for cutting steel, tool shape, chip breakers, grinding sequence.

20-183. How to Secure Fine Surfaces by Grinding. H. J. Wills and H. J. Ingram. *Machinery*, v. 50, May '44, pp. 181-182.

Lapping operations in the tool room.

20-184. Cutting Fluids for Machining Operations. *Machinery*, v. 50, May '44, pp. 187-189.

Functions and classes of cutting fluids and their application in machining different materials.

20-185. Spindle Nose Ground After Assembly. *American Machinist*, v. 88, May 25, '44, p. 111.

In order to make certain that spindle noses on its line of engine lathes run true, the Axelson Manufacturing Co. has devised a fixture through the use of which the surfaces on this member may be ground after the spindle has been assembled with the headstock.

20-186. Practical Ideas. *American Machinist*, v. 88, May 25, '44, pp. 115-120.

Reduces tool breakage when machine tapping holes. Camshaft keys fitted in a jig. Aluminum pins fasten laminated dies. Drill chuck used as punch holder. Magnetic clamp holds subassemblies for welding. Fillet turned without undercutting warped pipe. Anvil speeds hardness testing of tubes. Improves design of seam-welder mandrel. Large micrometer equipped with signal light. Machine reamer fed by gravity. Plug gages made from drill rod. Adjustable plug aligns bushing.

20-187. Step up Milling Efficiency by Using Fewer Cutter Teeth. Arthur A. Schwartz. *American Machinist*, v. 88, May 25, '44, pp. 112-113.

Take a heavier chip and cut faster so that the heat generated will be concentrated in the chips and got rid of before it has the chance to damage the tool or work.

20-188. Hyper Milling vs. Fly Cutter Milling. Gaylord G. Thompson. *Iron Age*, v. 153, May 18, '44, pp. 60-65.

Advantages of single-point fly cutter milling over multi-tooth face mills with negative rake angles are the lower power requirements, reduced cost and ease in maintenance. A cutter body is described in which the fly cutter can be mounted in one of several slots at various negative helix or axial rake angles to suit the particular operating condition.

(Continued on page 14)

NEW PRODUCTS IN REVIEW

SALVAGE AND EXTENSION WELDING OF SMALL TOOLS

Continental Machines, Inc.,
1301 Washington Ave. So., Minneapolis 4, Minn.

A new DoAll butt welder is just announced which extends the application of the band saw butt welder to making extensions to small tools, salvaging broken tools, and small miscellaneous welding operations. With this new butt welder, steel rods, steel tape, wire and wire forms up to ⅜ in. in diameter are quickly welded. Extensions to drills, screw drivers, small grinding wheels, and cutting tools can be made to order quickly and by inexperienced operators.

This welder is completely automatic and is easily operated with these four steps: Insertion and clamping of article into the welder jaws; pressing the welding switch; pressing the annealing switch; and dressing off the weld flash. Welder is available as a table model and as a pedestal type.

An electric etching attachment is available for operation with the welder. This attachment is valuable as a quick means of marking tools, templates, parts, etc. It is clamped to one of the welding jaws and marking is done with an etching pencil provided. Illustrated literature is available.

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INSTRUMENT WASHER

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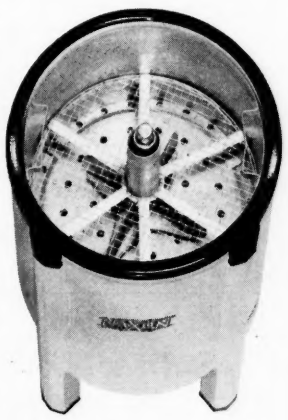
Especially designed for washing and cleaning aircraft, tank, automobile and navigation instruments and for the production cleaning of small parts, this portable instrument washer is said to dissolve and remove every type of foreign matter quickly and easily. Equipped with 4 to 5 separate removable trays, continuous operation can thus be obtained. Larger assemblies or parts can be cleaned without use of trays. If used for washing fine screw machine parts made of brass, copper or more precious metals, the filings, burrs, etc., salvaged in the cleansing process and trapped in the sediment basket, will in a very short time pay for the cost of the machine, it is said. Equipped with a fireproof, sparkless Naxon motor with lifetime bearings completely hidden in base of the machine, the washer is ready to operate when plugged in. Compact, the washer is 26 in. high by 18 in. diameter; it weighs under 50 lb.



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WELDING COMPOUND

G. W. Smith & Sons,
103 Sperling Ave., Dayton 3, Ohio

Protect-O-Metal is announced as a water-soluble compound which, when sprayed or brushed into the welding joint and upon the adjacent surfaces, prevents the adherence of spatter and assists in producing a less porous and consequently stronger weld. Users report that the compound, because of its deoxidizing action, prevents the formation of scale in the annealing oven when welded structures are heat treated at up to 1500° F. to relieve stresses. Removal of the compound after the heat treatment is said to be much easier and more economical than removing the scale which would otherwise form.

In the normal use of Protect-O-Metal for spatter-proofing, it is customary to wipe off the coating with a damp cloth in removing the spatter. Some users, however, let the coating remain on the metal after brushing off the spatter, for they have found that the compound provides an excellent base for paint or lacquer. If welded fabrications are not to be painted or lacquered, or if they are to be unfinished for some time, it has been found that a complete coat of the compound prevents rusting. Thus the compound is not only a spatter-proofing and fluxing agent, but also a rust and scale inhibitor and a priming coat for paint or lacquer. A gallon of the paste makes two to three gallons of solution when diluted with water. Complete literature is available.

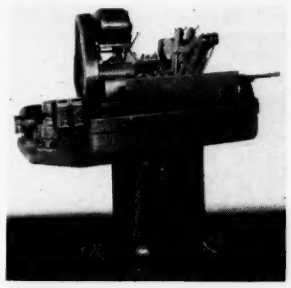
Mention R289 When Writing or Using Reader Service

LAPPER FOR CYLINDRICAL SURFACES

Norton Co., Worcester 6, Mass.

This Simplex Lapper is said to be a comparatively simple machine incorporating many of the features of the better-known Crank-O-Lap. It is designed for simultaneous finishing operations on one or several cylindrical surfaces.

Many machine parts, such as are found in radial aircraft engines and their accessories, have cylindrical sections between shoulders. Frequently adjacent gears or overhanging flanges prevent the use of conventional production lapping methods. The field for the refinement of such surfaces is covered by this Simplex Lapper. Surface finishes as low as one micrometer RMS are obtainable in a single, quick, inexpensive operation. One bearing or several on a work piece can be finished in a fraction of a minute. The Simplex will handle concentric and eccentric cylindrical portions at the same time, as well as such sections as the pins of the short-throw cranks on compressors, and the journals and eccentric members of small camshafts. It has a capacity from ½ in. to 2 in. on diameters with lengths up to 24 in. It uses abrasive coated paper strips scientifically and accurately applied to those surfaces on which reduced friction and initial wear are desired.



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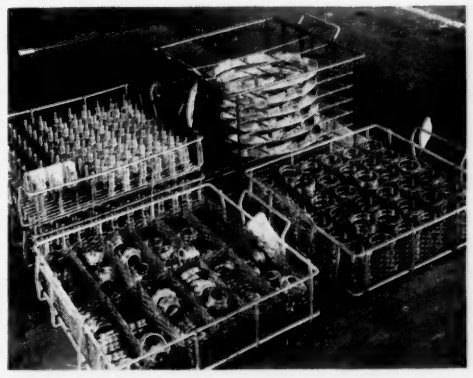
PADS FOR DEGREASING BASKETS

Resistoflex Corp., Belleville, N. J.

A problem encountered in industry is breakage of castings with thin walls, fins and projections by rough handling in degreasing baskets. A related difficulty is the scratching and corroding of highly polished machined parts through contact with degreasing basket surfaces.



A recent solution is the development of durable, solvent-proof, rubber-like pad to line degreasing baskets and provide castings and machined parts with a protective cushion while in the degreaser. The pads not only provide a cushioning effect but also are completely inert to the action of degreasing solvents, sulphur-base cutting oils, aromatic and aliphatic hydrocarbons, chlorinated hydrocarbons, etc. Smaller wire degreasing baskets (shown here) may be coated with a solution of the same resin, which is easily applied by a simple dipping process.

Mention R291 When Writing or Using Reader Service

LEVER-TYPE MECHANICAL INTERVAL TIMER

General Electric X-Ray Corp.,
2012 Jackson Blvd., Chicago 12, Ill.

This well-known interval timer is now again available. It measures any interval within a range of 15 sec. to 2 hr. The hands are set by means of the knurled knob extending through the face, and the timing interval is started by depressing the lever. At the expiration of any pre-set interval the timer rings a loud bell-alarm. The mechanism is housed in a black all-metal case. The crystal is made of plastic. It is finished with durable moisture-resisting black enamel.

Designed for X-ray work, these timers have found wide use in laboratories and industry generally.

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More New Products on Pages 15 and 17

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Metal Literature Review—*Continued*

20. MACHINING (*cont.*)

20-189. **Hand Drilling Operations Speeded Up.** Robert A. Trumpis and H. Honsberger. *Iron Age*, v. 153, May 18, '44, pp. 72-73.

Using a self-centering drill attachment and beveled guide holes in a panel jig has reduced drill breakage 50%, reduced time of drilling and improved quality in aircraft fuselage manufacture.

20-190. **Slinging Turret Lathes and Automatics.** *Machinery* (London), v. 64, April 6, '44, pp. 377-379.

Method of slinging the Herbert No. 9B combination turret lathe.

20-191. **Choosing the Right Material.** H. W. Gillett. *Machine Design*, v. 16, May '44, pp. 111-114, 164, 166, 168, 170, 172, 174.

Part VI—Ability to be processed. Machinability; crumbly chips aid machining; formability; tests become complex; weldability; characteristics affecting heat treating; processing by alternative methods; cold forming accentuates directional properties; castings reduce machining costs. 13 ref.

21. CLEANING AND FINISHING

21-51. **Cleaning Prior to Finishing.** James Rowan Ewing. *Metal Progress*, v. 45, May '44, pp. 894-895.

Introduction of synthetic organic chemicals, which are combined with distillates and solvents and applied in a water medium, to the end that one operation in a spray wash completely cleans and conditions the surface. By complete cleaning and conditioning is meant removing and rinsing off of all soils, including greases, oils, inerts, compounds, or any foreign matter, plus the passivation of the cleaned metal surface against atmospheric rust or corrosion during processing.

21-52. **Chemical Coatings on Steel.** V. M. Darsey. *Metal Progress* v. 45, May '44, pp. 895-897.

Phosphate and oxide coatings, phosphate coating for corrosion protection, phosphating as a base for paint, phosphate coating for wear resistance, phosphate coated steel for can manufacture, phosphate coating an aid in drawing steel, phosphate coating repels molten lead, zinc coated and phosphated steel, oxide coating on steel.

21-53. **Coatings on Aluminum by Chemical Treatment.** Ralph E. Pettit. *Metal Progress*, v. 45, May '44, p. 898.

Increased use of chemical coating processes for aluminum alloys due to the lower cost of chemical treatments, as contrasted with anodic oxidation processes. The difficulty of quickly obtaining equipment for anodic treatment plants; possible difficulties in obtaining certain materials for the anodic process. Protective coatings can be produced by chemical treatment on pieces which cannot, by reason of their shape and construction, be given an anodic coating.

21-54. **Surface Treatment of Magnesium Alloys.** W. S. Loose and H. K. Delong. *Metal Progress*, v. 45, May '44, pp. 899-900, 924.

Chrome-pickle treatment, dichromate treatment, sealed chrome-pickle treatment.

21-55. **What's Ahead in Finishing?** *American Machinist*, v. 88, April 27, '44, pp. 89-96.

Postwar production will benefit by war development. How finishing will be affected.

21-56. **Improved Cleaning of Forgings.** *Steel*, v. 114, May 1, '44, pp. 112, 114.

High production conveyorized systems for cleaning aluminum forgings.

21-57. **Synchronizing Ovens with Spray Booths.** C. A. Litzler. *Products Finishing*, v. 8, April '44, pp. 24-26, 28, 30, 32, 34, 36.

Four-zone conveyor oven has ventilation zone for dust-free operation on ordnance materials.

21-58. **Equipment for Pickling.** John E. Hyler. *Products Finishing*, v. 8, April '44, pp. 64, 66.

Pickling machines of rotary design.

21-59. **Gas Pickling of Steel.** *Ceramic Industry*, v. 42, May '44, pp. 50-53.

Because of the war, the gas pickling process has been applied commercially only to galvanizing. But it is believed that in the post-war period the process is capable of making valuable contributions to the preparation of metals for coating. Samples prepared for enameling have demonstrated superior results.

21-60. **Suggestions for Preparation and Heading of Polishing Wheels with Glue.** Gerald A. Lux. *Metal Finishing*, v. 42, May '44, pp. 264-266, 269.

Preparation of polishing wheels for heading, glue for heading polishing wheels, heading of polishing wheels, drying of wheel heads, breaking up or cracking wheel heads, balancing polishing wheels.

21-61. **Recovery of Free Acid from Pickling Liquors.** Harry W. Gehm. *Metal Finishing*, v. 42, May '44, pp. 270-271.

Acetone has been found superior to solvents previously tried for promoting the crystallization of copperas from pickling liquor. While not satisfactory for the treatment of continuous-process liquor, batch liquor responds well from the standpoints of ferrous sulfate removal, acid concentration, quality of separated copperas, and acetone separation. A system for applying this process without appreciable acetone loss may be of practical value. 2 ref.

21-62. **Durability Characteristics of Lustreless Enamels.** S. E. Beck. *Metal Finishing*, v. 42, May '44, pp. 307-308, 310, 316.

Durability of lustreless enamels, the various factors involved, etc. Contains much information which will provide a background and appreciation for these materials. 9 ref.

21-63. **Electrophoretic Finishing.** Edward J. Roehl. *Metal Finishing*, v. 42, May '44, pp. 313-316.

Electrophoretic plating of rubber, waxes, natural and synthetic resins, graphite, carbonates, oxides and metals, cellulose, bitumin, glass and enamel, lubricants. 22 ref.

21-64. **A Proposed Method of Cleaning Ground-In Precision Ball Bearings.** W. B. Spooner. *Machinery*, v. 50, May '44, p. 157.

How to remove the final traces of abrasive since ordinary cleaning materials and methods are not designed to insure the complete removal of solid particles, particularly of such finely divided material.

21-65. **Production Painting of Cargo Trailers.** Dale Musselman. *Industrial Finishing*, v. 20, May '44, pp. 18-22.

Conveyorized line through cleaning, painting, drying; rust-inhibitive primer plus olive drab paint; water-wash spray booths—paint supply line; paint mixing room—check on viscosity; small parts production; masking; women workers.

21-66. **How to Get More out of Your Equipment.** W. Beacham. *Industrial Finishing*, v. 20, May '44, pp. 54, 59-60.

Instruct new help on how to use equipment properly, a few suggestions about care of spray equipment, an example of what manufacturers are up against, water-wash booth that doesn't need compound, thorough and regular cleaning is desirable.

21-67. **Black Oxide Finish for Stainless Steel.** Irvine C. Clingan. *Steel*, v. 114, May 22, '44, pp. 80-81.

Quickly applied with new sodium dichromate process. 2 ref.

21-68. **Industrial Dryers and Drying Systems: III.** A. W. Ferre. *Industrial Heating*, v. 11, May '44, pp. 774, 776, 779, 780, 782, 784.

Factors involved in the selection of drying apparatus for a given application and the application of industrial drying equipment to the drying of enamel finishes, animal fur, etc.

21-69. **Side-By-Side Installation of Varnish Kettles and Baking Oven for Impregnating Transformer Coils.** *Industrial Heating*, v. 11, May '44, pp. 786-788.

The arrangement of varnish tanks beside a forced draft baking oven at the plant of the Franklin Transformer Co., has enabled the company to maintain uninterrupted production of coils and transformers despite manpower shortages.

21-70. **Fire Protection for the Finishing Department.** William H. Easton. *Products Finishing*, v. 8, May '44, pp. 38-40, 42, 44.

Plant workers properly trained and equipped for fire fighting frequently render invaluable assistance in checking industrial fires.

21-71. **A Thought to Aluminum.** Arthur R. McNeil. American Electroplaters' Society *Monthly Review*, v. 31, May '44, pp. 434-441.

Finishing of aluminum by mechanical, chemical, electrolytic oxide, electroplated, organic methods.

22. WELDING, BRAZING AND FLAME CUTTING

22-177. **Flash-Butt Welding.** J. H. Cooper, Jr., J. Riley and J. C. Barrett. *Iron Age*, v. 153, April 27, '44, pp. 48-54.

Techniques for controlling metallurgical changes around the heat-affected zone at the weld line and in the parent metal. Defects found in flash-butt welding are illustrated, the causes are indicated and remedies proposed. 11 ref.

22-178. **Longer Life from Tipped H. S. S. Tools.** Leo J. St. Clair. *Iron Age*, v. 153, April 27, '44, pp. 55-57.

Use of a soft, resilient bond and braze allows the use of hardnesses in the tip that would ordinarily be too high for safety in a solid tool and enables tipped high speed steel tools to out-perform solid tools of the same analysis. Wider use of high cobalt types in tip form is indicated.

22-179. **Oxyacetylene Pipe-Line Installations.** D. F. Guthrie and R. W. Stewart. *Welding Journal*, v. 23, April '44, pp. 301-310.

Engineering aspects of planning installation of oxy-acetylene pipe line for different types of industries.

22-180. **Large-Diameter Electrodes Speed up Shell Welding in Ship Construction.** M. H. MacKusick and R. V. Anderson. *Welding Journal*, v. 23, April '44, pp. 311-315.

The deep fillet procedure developed at the California Shipbuilding Corp. for welding fillets using E-6020-30 electrodes has more than doubled production footage where the use of this procedure is feasible; also electrodes ⅜-in. in size are being used for conventional welding in the flat position.

22-181. **Welded Plate-Girder Bridge Separates Connecticut Highways.** John F. Willis. *Welding Journal*, v. 23, April '44, pp. 315-317.

Unusual both in design and fabrication methods, this structure was under construction before the present priorities for steel went into effect. Over 12 miles of fillet welding was used, and it proved to be economical both of materials and of labor. Unit price data are also furnished.

22-182. **Hard Facing. J. R. Spence.** *Welding Journal*, 23, April '44, pp. 318-322.

Some pertinent facts concerning hard facing materials and their properties and why one type of hard-facing alloy may be superior to others for specific applications.

22-183. **The Welding of Copper Alloys.** C. E. Swift. *Welding Journal*, v. 23, April '44, pp. 323-326.

Welding procedures and welding rods for use with copper alloys are described and the fundamental characteristics of these metals that affect their weldability.

22-184. **The Application, Manufacture, Composition and Storage of Coated Metallic Arc Electrodes.** Orville T. Barnett. *Welding Journal*, v. 23, April '44, pp. 327-333.

A wide range of applications requiring a variety of characteristics, both metallurgically and from an operational standpoint, has made necessary some six fundamental types of mild steel welding electrodes. The application, manufacture, composition, and storage of these ordinary steel metallic arc-welding electrodes. 16 ref.

22-185. **How to Start a Cut Quickly.** H. H. Griffith. *Welding Journal*, v. 23, April '44, p. 334.

Trouble in getting a cut started when the starting point is not at an edge or corner of the work can be overcome by turning up a burr with a cold chisel at the point at which the cut is to start.

22-186. **A Review of Bronze Welding.** H. R. Morrison. *Welding Journal*, v. 23, April '44, pp. 336, 338.

Advantages, procedures and uses.

(Continued on page 16)

Grange Defines Role of Boron As Steel Hardening Agent

Reported by Walter G. Patton
Climax Molybdenum Co.

Boron took a step forward in Detroit on the evening of April 10 towards becoming a better understood hardening agent in steel. The place boron is likely ultimately to occupy in steel was clearly defined by R. A. Grange of the U. S. Steel Corp. Research Laboratories, who addressed the Detroit Chapter of the A.S.M. on "Effect of Boron Upon the Structure and Heat Treatment Characteristics of Steel."

Classified by the Government Censor as a "restricted subject", Mr. Grange's timely remarks must be restricted to the listening audience. It is a tribute to Mr. Grange as well as to the research organization he represents that the speaker was able to handle so controversial a subject in such an acceptable manner.

The coffee talk was given by W. E. Burnett, technical observer for Cadillac Motor Co., who has just returned from the Mediterranean war area.

Gordon Directs Western Cartridge Advertising

E. H. GORDON, former advertising manager of the Hyde Park Breweries Association of St. Louis, has been appointed coordinator of advertising of Western Cartridge Co. and its affiliated companies and divisions. His previous experience also includes positions with Socony-Vacuum Oil Co. and Shell Oil Co., in their advertising and marketing divisions.

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THE Globe MACHINE AND STAMPING CO. CLEVELAND 2, OHIO

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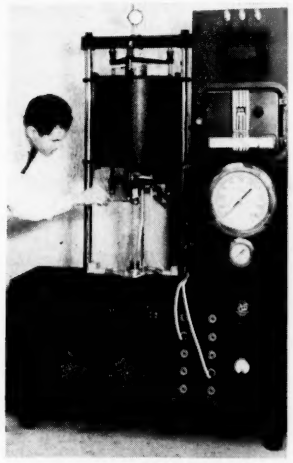
NEW PRODUCTS IN REVIEW

NEW DILATOMETER FOR HIGH TEMPERATURE TESTING

Harry W. Dietert Co.,
9330 Roselawn Ave., Detroit 4, Mich.

Carrying on extensive research in the field of high temperature testing of foundry molding and ceramic materials, this company has made available an improved dilatometer, equipped with a furnace that will operate between the temperature ranges of 500 to 3000° F.

The test specimen size most commonly used is 1⅛ in. in diameter and 2 in. in length. To determine the hot strength of the specimen at elevated temperatures, the specimen is loaded in the furnace by means of a motor driven, hydraulic operated plunger which may be used to load the specimen in compression. The compression strength is recorded on a large test gage. Expansion or contraction of the specimen is readily obtained either for thermal shock or for gradual temperature rise. Both free and confined expansion or contraction tests are permissible.



The instrument also lends itself to spalling tests for either shock or gradual temperature immersion. Accessories are available to measure the hot permeability of materials at elevated temperature. Gas pressure created by materials at elevated temperature is also measured with this unit.

For studying troublesome foundry problems, test methods and accessories are available for determining metal penetration, veining, and grooving. With this same equipment, one may measure the facing or protective value of various foundry or glazing materials. All of the controls are mounted on a panel which makes the entire unit self-contained and easy to operate.

Mention R295 When Writing or Using Reader Service

ROD SAVER ELECTRODE HOLDER

Martin Wells, 5886 Compton Ave., Los Angeles 1, Calif.

An exclusive—the reinforced snap-on insulator cap—is one of the many features combined in the new rod saver, latest addition to the line of Suregrip electrode holders manufactured by this company. The insulator cap is made of heavy plastic with reinforced jacket. It is notched on the inside so that it slips over the vise body and is held securely in place by a steel spring. No screws are required to hold it, hence the danger of arcing due to contact with exposed screws is eliminated. Insulators can be easily and quickly replaced by breaking the damaged insulator with the chipping hammer and snapping a new one into place.

The vise body provides a positive grip up to 1000 psi. pressure, that prevents dropping rods. The new rod saver rod hole is set at a 60° angle, giving the welder greater flexibility and ease in reaching inaccessible and tight corners. Hole accommodates through 5/16-in. rods.

Mention R296 When Writing or Using Reader Service

ROTATING TABLE FOR MACHINING

Machine Products Corp., Detroit, Mich.

Two new sizes—a 12-in. and a 24-in. Rotab—have been developed to broaden the scope of applications of this unique device, bringing greater efficiency and increased savings in production time to milling and boring operations where machining or checking of unusual angles must be performed.

The compact design of the 12-in. model is particularly adapted to milling operations and lends itself to easy mounting on the table of a milling machine. Despite its diminished size, this model provides all the rigidity necessary to withstand any machining operations that would normally be required of it.

Like the original 36-in. Rotabs, this small model has a rotating table to which the work is clamped. Since the

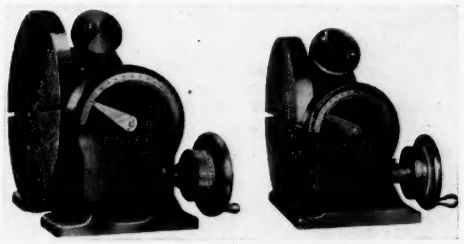


table can be turned to any degree and can be made to assume any position radially in addition to permitting its plane to be fixed to any angle from the vertical to the horizontal and even to a position 30° in the opposite direction without disturbing the initial clamping of the work, use of the Rotab effects considerable time savings in reclamping and resetting when new positioning of the same work is necessary. Greater accuracy in machining is also said to be achieved. The 12-in. model weighs 125 lb. The 24-in. model can be adapted to a wide range of milling and boring operations. Its weight is 688 lb.

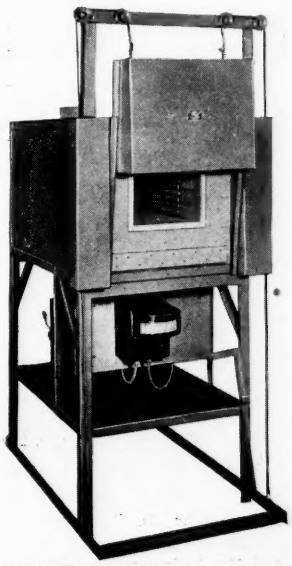
Both models have dials showing degree and minute graduations which register the angle of setting. An adjustable degree ring is under the face plate to avoid excessive turning of the handwheel to obtain the zero setting. A sine bar is furnished to provide greater accuracy on angular settings. The tables, which are hand scraped, may be locked at any desired position—radial or angular—and can also be disengaged to rotate freely by hand. Good delivery.

Mention R297 When Writing or Using Reader Service

FLOOR MODEL HEAT TREATING FURNACES

K. H. Huppert Co.,
6830 Cottage Grove Ave., Chicago 37, Ill.

A new series of floor model furnaces is being marketed by this company. The standard line will consist of five basic designs. Five or more variations will be available in each of these, dealing particularly with the inside depth of the furnace.



This model—16—has work chamber dimensions of 12 in. wide, 8 in. high and 18 in. deep, plus 8-in. throat. This furnace is also available as model 16a with the same width and height, but a depth of 24 in. In model 16b the width and height remain the same as in model 16 with a depth of 36 in. The total overall dimensions on model 16 are 35 in. wide, 6 ft. 10 in. high, 46 in. deep and like variations as above, with the width and height remaining the same. On model 16a depth is 52 in. and in model 16b the depth is increased to 64 in. The dimensions of the door in all models described here are 21 in. wide, 17 in. high, 8 in. thick.

Heating elements have totally enclosed contacts and connecting wiring is brought through the back of the furnaces into a special compartment provided for that purpose. Furnaces have a maximum operating temperature of 1850° for continuous operation and 1950° for intermittent use.

One number 221 Wheelco Capacitrol, one Chromel-Alumel thermocouple with protecting tube and necessary lead wire, one magnetic contactor, one fused switch box and all electrical interconnections between these parts are standard equipment. Furnaces are complete, ready to hook up when delivered.

Mention R298 When Writing or Using Reader Service

QUENCH OIL ACCELERATOR

Park Chemical Co., Detroit, Mich.

Ordinary quenching oils can be economically stepped up to the performance levels of fast quenching oils by addition of Park Quench Oil Accelerator, according to announcement of this new product.

An all-mineral product, this accelerator makes it unnecessary to throw away used oils when faster quenching rates are sought. By adding accelerator in a ratio of one to four to oil already in a system, the viscosity, flash and fire points of the original oil are raised slightly while cooling rates for steel are definitely increased. Deleterious elements in the original quenching oil are diluted without any stratification or settling out.

Marked savings are said to be possible by this method.

Mention R299 When Writing or Using Reader Service

CORRECTION, PLEASE! — A typographical error in the May issue of THE REVIEW, page 14, stated that free samples were available of "Kennamills", inserted-blade cutters manufactured by Kennametal, Inc. It should have read "Complete catalog available."

NEW SALT BATH FURNACE

Upton Electric Furnace Div.,
7450 Melville, Detroit, Mich.

An electric salt bath furnace for heat treating cartridge cases that features exceptionally large size for its type has been completed by this company. Having a pot size of 21 ft. in length by 56 in. in width with a working depth of 21½ in., the salt bath furnace will be used to full anneal cartridge cases on a continuous production heat treating basis.

The uniform heating of the salt throughout such a large furnace pot is accomplished by the correct spacing of a series of sealing electrodes and proper application of electric current. These electrodes, which extend through from the outside of the furnace where connection is made to the transformers, are built so that their inside surface is flush with the bricking which forms the interior surface of the walls and floor of the pot itself. The absence of electrodes extending from above the surface of the salt down into the bath eliminates the possibility of shorting and burning the work. Moreover, greater efficiency and uniformity of heating is claimed by reason of the fact that the electrodes generate heat in the salt at the bottom of the furnace so that a natural, normal circulation of heated salt exists throughout the entire furnace. The molten salt will be held at a temperature of approximately 900° F. Power for the heating of the salt will be by means of three-phase alternating current connected to six transformers which in turn are connected to the six electrodes in the furnace—the transformers being used in pairs rather than singly for greater efficiency of operation. The offset at the far end of the furnace is to permit a conveyor to return the work through the bath without lifting it out of the molten salt.

Mention R300 When Writing or Using Reader Service

NEW USES FOR PHOTO-COPIES

American Photocopy Equipment Co.,
2849 N. Clark St., Chicago 14, Ill.

The vital war-time need for saving time without mistakes in copying has been responsible for the increasing use of this photo-copy machine. Accurate and exacting, the machine is used to reproduce blueprints, confidential data, contracts, bids, etc. Photo-copies are made in faithful detail up to 18 x 22 in. in the exact size of the original. They are non-fading; therefore they are usable, permanent records and permit keeping important originals in a safe place. Requiring no technically trained operator, and being usable on any table or desk, the A-PE-CO Photo-Copyer is a fast, convenient, low-cost, mistake-proof means of expediting work in all departments of all businesses.

Mention R301 When Writing or Using Reader Service

LARGER GRAPHITE ELECTRODES

National Carbon Co., Inc.,
W. 117th and Madison Ave., Cleveland, Ohio

Two new and larger sizes of graphite electrodes have been developed by this company. The electrodes are 24 in. and 30 in. in diameter—the first graphite electrodes of these sizes produced commercially. Major problem to be met in increasing the size of graphite electrodes, without sacrificing other desirable physical properties, was that of strength. Although at present there are no electric steel furnaces which require these sizes, their availability will make possible new developments in furnace design.

Mention R302 When Writing or Using Reader Service

More New Products on Pages 13 and 17

A.S.M. Review of Current Metal Literature — *Continued*

22. WELDING (*cont.*)

22-187. **Spot Weld Joint Efficiency.** S. Wong and C. W. Steward. *Welding Journal*, v. 23, April '44, pp. 170-s-184-s.
The type of joint pattern, the method of surface preparation prior to welding, and the many variables involved in the spot welding process are factors which contribute to the effectiveness of the joint. Test data and a description of the results. 4 ref.

22-188. **A Test of Longitudinal Welded Joints in Medium and High-Tensile Steel.** A. G. Bissell. *Welding Journal*, v. 23, April '44, pp. 185-s-191-s.
In using the available electrodes, unless a very short arc was used, hard and brittle deposited metal was obtained. By experimental work it was demonstrated that the contributing factor to this hardness was atmospheric nitrogen. 3 ref.

22-189. **Steel Castings—Their Properties and Use in Weldments.** E. J. Wellauer. *Welding Journal*, v. 23, April '44, pp. 193-s-200-s.
The engineering and metallurgical properties of cast steel suitable for welding; the factors of design and specification required to insure satisfactory castings for welding; the economics of steel castings for weldments including typical examples. 4 ref.

22-190. **Weldability of Steel.** Martin Seyt. *Welding Journal*, v. 23, April '44, pp. 200-s-205-s.
Cracks in welds and welded structures, tests for hard areas, controlling ductility and hardness.

22-191. **The Effect of Peening as a Method of Stress Relieving Applied to Welds.** O. H. Henry and E. M. Damen. *Welding Journal*, v. 23, April '44, pp. 206-s-207-s.
The relative importance of rate of peening on the amount of stress relief accomplished by the application of this method.

22-192. **Stress-Relieving and Peening Temperatures.** Ralph E. Spaulding. *Welding Journal*, v. 23, April '44, p. 208-s.
Temperature-strength curve showing variations in physical characteristics of structural steel due to temperature changes.

22-193. **Practical Ways to Improve Machine-Cutting.** *Oxy-Acetylene Tips*, v. 23, April '44, pp. 37-44.
Nozzle selection, flame adjustment, starting the cut, per cent of lag, characteristics of kerf, bevel cuts.

22-194. **How to Weld Steel Plate.** *Oxy-Acetylene Tips*, v. 23. April '44, pp. 45-50.
Simple instructions that will help the operator to master the forehand welding of low carbon steel.

22-195. **Minimizing Hazards.** *Oxy-Acetylene Tips*, v. 23, April '44, pp. 52-54.
Welding and cutting fires and accidents are preventable. 9 ref.

22-196. **Hints on Silver-Brazing.** *Oxy-Acetylene Tips*, v. 23, April '44, pp. 55-57.
Physical properties; flux is essential; use proper heat; corrosion resistance.

22-197. **Bronze-Welding an Ore Roaster.** *Oxy-Acetylene Tips*, v. 23, April '44, p. 57.
Repair of damaged casting prevents long shutdown.

22-198. **Welding Refinements Simplify Sheet-Metal Fabrication.** *Product Engineering*, v. 15, March '44, pp. 166-169.
Electronic control of current in arc- and resistance-welding boosts the fabrication of light-gage sheet-metal parts. Welding can replace riveting for this type of fabrication. Typical examples suggest welded stampings for simplified design.

22-199. **Automatic Arc Welding.** G. W. Birdsall *Steel*, v. 114, May 1, '44, pp. 100-103, 138, 140-141.
Effective method for producing parts on mass production basis in making upper rollers for half-tracs.

22-200. **The Relation Between Weldability and Wear of Cutting Tools.** Walter Dawihl and Walter Rix. *Metallurgia*, v. 29, March '44, pp. 270-272.
Wear of cutting tools used for the machining of steel is due mainly to the formation of welds between the tool and the material to be cut. The influence of time and pressure on the strength of welds between steel and steel, and between steel and cemented carbides, contributes further evidence in support of this. 17 ref.

22-201. **Plastic Bonding.** *Aircraft Production*, v. 6, April '44, pp. 171-172.
Cycleweld process in making joints between metal, wood and other materials.

22-202. **British Merchant Shipbuilding.** R. B. Shepheard. *Welding*, v. 12, March '44, pp. 145-156, 164.
Aspects of recent changes in merchant ship construction; provision and installation of heavy duty welding equipment; high speed procedures and modifications to hull form for fabrication.

22-203. **New Design for Barges.** *Welding*, v. 12, March '44, pp. 157-158.
Utilization of welded steel frames and concrete.

22-204. **Aluminum Welding with Liquefied Gas.** J. V. Kielb. *Iron Age*, v. 153, May 4, '44, pp. 67, 152.
Propane (C_3H_8) gas as an alternate fuel for welding aluminum sheet metal and castings. Due to its low cost and safety features, its application in the past few years has spread tremendously in such fields as cutting of steels, fuel for carburizing furnaces and other heat treating operations.

22-205. **Atomic Hydrogen Welding.** Percy H. Take. *Canadian Metals and Metallurgical Industries*, v. 7, April '44, pp. 33-34, 40-41.
Application, advantages, equipment, operation and procedure.

22-206. **Flash-Weld Proof-Loaders.** Weller Johnson. *Automotive and Aviation Industries*, v. 30, May 1, '44, pp. 34-35, 152.
Description of proof-loading machines for testing ⅜-in. control rods and ¾-in. and 1-in. tubes.

22-207. **Spot Welding Substituted for Riveting on B-17 Sub-Assemblies.** F. C. Pipher. *Automotive and Aviation Industries*, v. 30, May 1, '44, pp. 40, 88.
Investigation has revealed average savings in cost of 57% over the hand riveting method.

22-208. **Maintenance of Resistance Welders.** E. R. Spittler. *Industry & Power*, v. 46, May '44, p. 75.
Indicates the resistance welding units that require special attention to insure uninterrupted production.

22-209. **Blow-Hole Formation in Oxy-Acetylene Welding of Aluminum Alloy.** Th. Ricken and H. Gagel. *Engineers' Digest*, v. 1, April '44, p. 283.
Blow-hole formation is fostered by the heat insulating action of the firebrick backing, while the high thermal conductivity of the copper insured a rapid removal of welding heat, thus suppressing blow-hole formation.

22-210. **Joint Fit-Up and Backing Plates for Welding Magnesium.** F. A. Wassell. *Automotive Industries*, v. 90, May 1, '44, pp. 34, 82.
For the welding of the lighter gages of magnesium, up to around 3/16 in., small welders of approximately 150-amp. capacity are used; but for the welding of the heavier gages or for high-speed welding, machines of about 300 amp. are required. Mg is always welded with reverse polarity, with the electrode positive and the work negative, since straight polarity results in an unstable arc and excessive spatter.

22-211. **Beam Marks the Spot.** A. B. White. *Metal Progress*, v. 45, May '44, p. 903.
Use of pinhole lamp for spacing spot welds.

22-212. **Hard Surfacing by "Two-Tone" Welding.** Joseph A. Cunningham. *Metal Progress*, v. 45, May '44, p. 903.
Method cuts time required for rebuilding of worn surfaces.

22-213. **Worn Parts Rebuilt by "Two-Tone" Arc Welding.** J. A. Cunningham. *Iron Age*, v. 153, May 11, '44, pp. 72-73.
A new technique using an auxiliary cast iron or high carbon steel filler rod in conjunction with an arc welding electrode speeds up rebuilding of worn surfaces by as much as 300%. Originally applied to the repair of contractors' equipment, the process should find use in maintenance of all kinds of heavy machinery subject to abrasive wear.

22-214. **Instrument Signals Spot Weld Consistency.** Harold J. Hague. *Iron Age*, v. 153, May 11, '44, p. 77.
Weld comparer consists of instrument, housing, gong, transformer, range switch and sensitivity control.

22-215. **Brazing Applications Produce Strong Non-Corrosive Joints.** Lawrence D. Jennings. *American Machinist*, v. 88, May 11, '44, pp. 90-93.
Process for joining metals proves economical in fabricating small and intricate parts. Copper and silver-copper alloys used as brazing materials.

22-216. **Flame-Cutting Big Crankshafts.** R. L. Deily and E. Benyo. *Welding Engineer*, v. 29, May '44, pp. 33-35.
Because wartime necessity made the normal procedure of forging and machining impossible, flame-cutting had to be used to produce giant five-throw ship crankshafts. Thicknesses up to 42 in. were successfully cut with the torch during the course of this important assignment.

22-217. **Welding Silver-Clad Steel.** Arthur Schwarz and Walter B. Meyer. *Welding Engineer*, v. 29, May '44, pp. 36-38.
Difficult welding problems encountered in the "pioneer" fabrication of large silver-lined columns for an oil-refining process overcome.

22-218. **Tanks for Big Navy Guns.** T. B. Jefferson. *Welding Engineer*, v. 29, May '44, pp. 39-41.
Electric-hydraulic rammer tanks must be fabricated to close tolerances. Difficult welding problems to solve at Northern Ordnance.

22-219. **The Welding Engineer—What's His Job?** Walter J. Brooking. *Welding Engineer*, v. 29, May '44, pp. 42-44.
The establishment of general welding procedures.

22-220. **Servicing Welder Controls.** E. Stolte and R. Washburn. *Welding Engineer*, v. 29, May '44, pp. 45-47.
Electronic control panels are seldom the cause of troubles in resistance welding circuits. What to do when they are.

22-221. **Welders in 40 Hours.** *Welding Engineer*, v. 29, May '44, p. 48.
Moore Dry Dock Co. standardized welding instruction. Welders capable of fine production work can be turned out with 40 hours of pre-employment training plus 2 to 3 months' training on the job.

22-222. **Health Hazards Associated with Welding.** F. W. Hutchinson. *Heating and Ventilating*, v. 41, May '44, pp. 73-77.
Classification of hazards, irradiation, fumes, gases, criteria and methods of control.

22-223. **New Steel-Aluminum Bond Boosts Engine Power.** Marshall G. Whitfield and Victor Sheshunoff. *Product Engineering*, v. 15, May '44, pp. 333-335.
Composite steel and aluminum cylinder barrels, which are used in Ranger aircraft engines to increase power by combining the strength of steel with the rapid heat dissipation of aluminum, show the possibilities of a new method of bonding these two materials together for all kinds of parts—castings, forgings, sheet metal, and others.

22-224. **The All-Welded 105-Mm. Howitzer Carriage.** Eugene Morze and Ernest Kalist. *Industry & Welding*, v. 17, May '44, pp. 29-31, 66, 68-72.
In all-welding procedure a careful and judicious use of arc temperature and position is maintained so as to afford maximum penetration with least defects and inclusions.

22-225. **Repair Welding a Heavy Cylinder Casting.** J. R. Mitchell. *Industry & Welding*, v. 17, May '44, pp. 32-33, 37-38.
Description of an arc welded repair on the cylinder casting of a 2800-ton hydraulic press demonstrates the importance of welding in our present war effort.

22-226. **Reclamation of Armature Bearings for Street Railways.** E. E. Olson. *Industry & Welding*, v. 17, May '44, pp. 42-43.
How a production increase of 175% and a reduction in cost of 78% was effected by changing from a former method.

22-227. **Stud Welders Speed Ships.** *Industry & Welding*, v. 17, May '44, pp. 46-47.
Principle and application of the stud welder.

22-228. **Controlled Atmosphere Brazing in Aircraft Engine Production.** *Industry & Welding*, v. 17, May '44, pp. 62-64.
Steps preparatory to copper brazing the fins in the two parts of a fluid impeller drive for the supercharger on the 2000-h.p. Pratt & Whitney aircraft engine being manufactured in the Kenosha Plant of Nash-Kelvinator.

22-229. **Welded Heaters Keep Our Navy Warm.** *Industry & Welding*, v. 17, May '44, pp. 80-81.
To meet the requirements for strength, compactness and light weight, McQuay, Inc., Minneapolis, manufacturers of ventilating heaters, has adopted welding construction for their units.

22-230. **Tips on the Care and Maintenance of Production Resistance Welding Equipment.** E. R. Spittler. *Industry & Welding*, v. 17, May '44, pp. 82-86.
The maintenance tips resulting from many years of practical experience with resistance welding equipment.

22-231. **Arc Welded Table for Oxy-Acetylene Cutting.** Charles Apacki. *Industry & Welding*, v. 17, May '44, pp. 87-88.
Table made from scrap tubing, angle iron, and pipe.

22-232. **Blast Furnace Equipment Repair.** F. L. Lindemuth. *Industry & Welding*, v. 17, May '44, pp. 89-94.
All the work done from the outside of the furnace and without shutting it down.

22-233. **Soldering Signal Corps Equipment.** Milton Salant. *American Machinist*, v. 88, May 25, '44, p. 114.
Cleaning the joint, sound joints, flux, weight of iron, shape of iron, soldering technique, precautions when soldering.

22-234. **Welding Sequence in Shipbuilding.** Milton Forman. *Welding Journal*, v. 23, May '44, pp. 401-407.
Welding engineering no longer blind and experimental. Results can be achieved if the instructions are properly transmitted to the men supervising and doing the work. There should be no job or problem that is not analyzed by the welding engineer.

22-235. **Atomic-Hydrogen Arc Welding in Aircraft Production.** Wm. J. Van den Akker. *Welding Journal*, v. 23, May '44, pp. 408-410.
Achievement in the field of the welding of light-gage materials used in the aircraft industry. Fuller utilization of existing welding facilities coupled with an increased knowledge of welding design as well as of the metallurgical characteristics of the special alloys used.

22-236. **Organization and Reclamation of Tools and Gages.** Joseph V. Kielb. *Welding Journal*, v. 23, May '44, pp. 417-422.
Functions of departmental heads essential to a successful tool reclamation program.

22-237. **Sequence in Welding of Ships.** O. Ovregaard. *Welding Journal*, v. 23, May '44, pp. 423-433.
Desirable method and sequence of welding in ship's hulls. Welded connections, static strength of welded hulls, fatigue, advantages of welding in connection with ship construction, emergency cargo vessel for war purposes, design and erection, vessel for war purposes, sequence proper.

22-238. **Arc Welding in Airplane Boiler Fabrication.** H. A. Lebert and S. B. Willoughby. *Welding Journal*, v. 23, May '44, pp. 434-437.
Manufacturing corrugated boilers reduced to its simplest form through the use of arc welding.

22-239. **Shrinkage Stresses in Welding.** Review of the Literature from Jan. 1, 1937, to Sept. 1, 1943 (Foreign Literature to Jan. 1, 1941). W. Spraragen and M. A. Cordovi. *Welding Journal*, v. 23, May '44, pp. 209-s-246-s.
Butt joints, unionmelt, fillet welded joints, welded bridge girders, welded cylindrical members, beads deposited on surface and edges of plate, pre-heating, stress relief by thermal treatment and peening, behavior of residual stresses under external load, cracks, crack-sensitivity tests, theoretical aspects. 124 ref.

22-240. **Properties of Heat-Treated Flash Welds in a Chromium-Nickel-Molybdenum Steel.** J. C. Barrett. *Welding Journal*, v. 23, May '44, pp. 250-s-254-s.
Problems of obtaining a flash-welded part which, in the heat treated condition, will have properties as good as the unwelded stock.

22-241. **Stress Distribution in Spot-Welded Joints.** G. P. Michailov. *Welding Journal*, v. 23, May '44, pp. 255-s.
Stress distribution patterns produced on loading multiple spot-welded joints in steel.

22-242. **New Developments in Use of Welding in Production of Stamped Products.** *Steel Processing*, v. 30, May '44, pp. 289-291, 296.
Economics of the use of stamped, drawn and pressed metal, growth in the use of welding, of all types, in the joining of stampings.

22-243. **Cost of Meehanite Castings vs. Welded Structures.** L. F. Williams. *Iron Age*, v. 153, May 18, '44, pp. 78-82.
In the manufacture of diesel engine components from welded steel fabricated both within and without its own shops, this company compares factory costs with those of comparable parts machined from Meehanite castings and has found them very much in favor of castings when production runs are moderate.

22-244. **Stresses in Welded Structures.** H. C. Boardman. American Iron and Steel Institute Advance Paper, May 25, '44, 11 pp.
Concerns fusion welded structures of plain low carbon steels having well-defined plastic yield ranges at about one half of the ultimate strength. Discusses the questions: What are the corresponding plastic yield ranges for all conditions of biaxial stresses (all-directional in a plane) and for all conditions of triaxial (all-directional) stresses? When does plastic yielding mean safety? When does it mean failure?

22-245. **Recent Progress in the Scientific Application of Welding to Steel.** Wendell F. Hess. American Iron and Steel Institute Advance Paper, May 25, '44, 11 pp.
Factors affecting the successful application of welding: Metallurgical response characteristics of the steel, selection of the process of welding, design of the structure, production of residual stresses. Methods of solving welding problems, involving thermal measurements and mechanical and hardness tests.

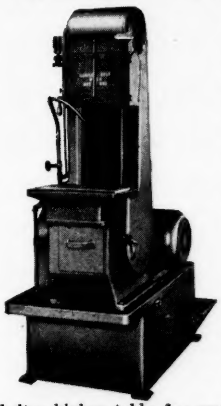
(Continued on page 18)

NEW PRODUCTS IN REVIEW

NEW WET BELT GRINDER

Porter-Cable Machine Co., Syracuse, N. Y.

Since the introduction of high speed wet belt machining, there has been a demand among users for a machine with greater coolant capacity and more rigid construction for greater grinding accuracy, it is said. In the new Model AG-8 wet belt surfacer, it is claimed these requirements have been adequately filled. Equipped with a 35-gallon self-contained recirculating pump system, an abundance of coolant is readily available for all grinding operations.



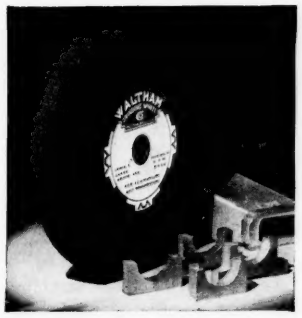
Close tolerances, often to 0.0005 in., are held on this new machine even with inexperienced operators. Other new features include a readily accessible waste clean-out drawer; new joggle type switch for easier tracking of belts; higher table for greater convenience to operator; flexible tube to provide spot coolant where it is needed in greater quantity and greater platen grinding area. New machine is used for grinding steel, aluminum, bronze, magnesium, and other materials. Such hazards as heating, warping, discoloring, flowing and chipping of material being ground are eliminated.

Mention R303 When Writing or Using Reader Service

GRINDING WHEEL FOR ALUMINUM AND MAGNESIUM

Waltham Grinding Wheel Co.,
43 Emery St., Waltham, Mass.

Tremendously increased use of aluminum and magnesium has made the grinding of this material an important problem. The characteristics of this metal tend to cause the face of the grinding wheel to load and become filled with material much quicker than is customarily experienced in grinding iron and steel. This company has developed a special resinoid grinding wheel which does not follow the usual production recommendation in grinding aluminum and magnesium, but utilizes a semi-friable grain combining an open structure with a special treatment.



It is believed this is the first grinding wheel developed especially for grinding these light metals. It has gone beyond the experimental stage and already is in service in several important producing foundries.

Mention R304 When Writing or Using Reader Service

NEW ONE-PIECE HOSE CLAMPS

Tinnerman Products, Inc.,
2026 Fulton Rd., Cleveland 13, Ohio

A new one-piece hose clamp using no gears, thumb screws or intricate locking means is announced by this company. The clamp may be snapped over the hose into pre-latch position by hand. Final lock is made with hand pressure on ordinary pliers. Made for low pressure connections, this new clamp has a lower profile, is lighter in weight and exerts an even pressure around the entire circumference of the hose. Being a one-piece clamp and using no threaded parts, it drastically reduces weight and assembly time. Made of S.A.E. 1060 spring steel with parkerize and zinc chromate primer finish. Available for all sizes of AN and Ordnance specification hose in a wide range from ½ in. O.D. and up.

Mention R305 When Writing or Using Reader Service

PREPARING ALUMINUM FOR SPOT WELDING

Turco Products, Inc.,
6135 S. Central Ave., Los Angeles, Calif.

A new method for rendering aluminum surfaces chemically and metallurgically clean in preparation for spot welding, is announced by this company. Turco Vulco-Etch is a chemical bath which frees aluminum alloy surfaces of oxides, corrosive salts, and oil films.

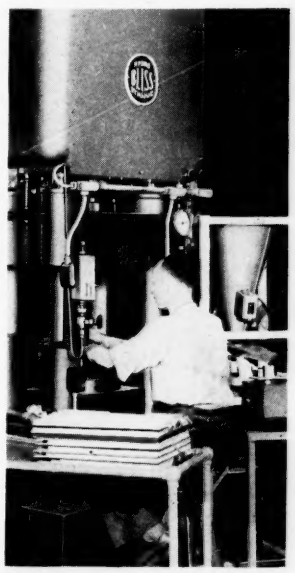
Consistent, strong spot welds cannot be obtained if the aluminum surface is oxidized, oily or contaminated with corrosive salts. When the surface in contact with the electrode is not perfectly clean, resistance of the metal to the flow of electrical current is increased. The resultant excessively high temperatures may be responsible for cracked welds, blowholes and other irregularities. Further, surface impurities cause unsymmetrical weld contours, and weaken the weld by reducing tensile strength, elasticity, and fatigue resistance of the metal.

Cleaning and etching with Vulco-Etch are accomplished in a 5 to 20-min. dip in the solution. Unheated wood-lined, rubber-lined or crockery tanks are used. The material rinses freely in fresh, cool, running water. The solution may be used for months without change.

Mention R306 When Writing or Using Reader Service

HYDRAULIC PRESS FOR POWDERED METALS

E. W. Bliss Co., 53d St. & 2d Ave., Brooklyn 32, N. Y.



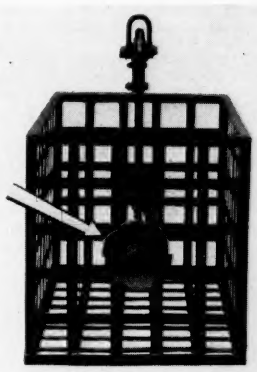
This 200-ton press is one of the many varieties of hydraulic and mechanical presses now made by this company for the compression of powdered metal. Here a magnet pole is being made of iron powder. The press is provided with a fully automatic cycle with quick advance to the work, changing speed before contact with the work, pressing, return, ejection and return of the ejector. Pressure and speed are both adjustable over a wide range, making the press available for different types of work with accurate pressure control at all times. Similar presses are available in capacities to 5000 tons. Special presses of multi-slide construction for special shapes such as wide flanged bushings are also available.

Mention R307 When Writing or Using Reader Service

RATCHET PICKLING BASKET

Youngstown Welding and Engineering Co.,
Youngstown, Ohio

In pickling pots, pans, vessels, and many types of metal parts, it is necessary to drain the pickling acids from within the containers easily and quickly. Thus the openings and lattice work of the baskets should be large enough to permit rapid flow of the acids but, in addition, a ratchet that permits the basket to be tipped in a variety of positions gives valuable aid in drainage.



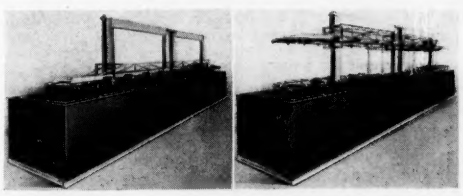
This company has developed for some of its baskets a new simplified ratchet which holds the basket in six different positions. It is positive and strong enough to be applied to practically any size equipment. The ratchet is pictured here on a crate 60 in. long, 32 in. wide, and 33 in. deep; it weighs 304 lb., and carries a 3,000-lb. load.

Mention R308 When Writing or Using Reader Service

FULLY AUTOMATIC PLATING MACHINE

The Udylite Corp.,
1651 E. Grand Blvd., Detroit 11, Mich.

After a thorough survey of the industry, this company discovered that over 80% of all parts electroplated could be handled more efficiently and economically on a fully automatic plating machine. The survey also disclosed the most workable size for such a machine, to be used in the average plant, would be 35x6x9 ft. Because of this, Udylite engineers have developed a packaged full automatic plater which can be sold as a complete unit, shipped in assembled condition in one freight car and easily installed.



This full automatic is new only as a unit. Its operating principles and various mechanisms have been in use on some of the company's equipment for many years. A new square type, space-saving transfer system was worked out which not only requires less space but permits a wide variation of transfer speeds—lift, transfer and lowering rate being variable, independently. Racks are spaced on 18-in. centers but this may be varied, at will, without readjustment of the transfer mechanism.

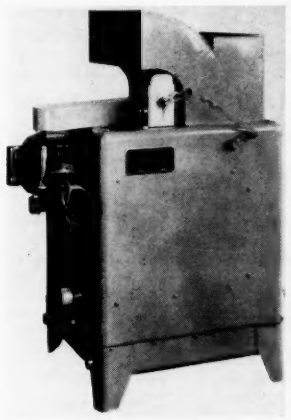
Operating principle is very simple and the unit has few moving parts, greatly reducing maintenance and operating expense. A single row carrier system avoids crowding and burning on turns with greater ease of load and unload. Handles up to 76 racks per hour, variable to work requirements. Heavy duty, copper anode and cathode rods afford positive self-aligning hook contact. A single, hydraulic mechanism provides smooth, positive transfer.

Mention R309 When Writing or Using Reader Service

COMPRESSED AIR AND GAS COOLING EQUIPMENT

Niagara Blower Co.,
6 E. 45th St., New York 17, N. Y.

Improved equipment for the cooling of compressed air results in drier air and prevents water damage to pneumatic equipment—for example, rapid wearing out of parts because of washing out of lubricants; freezing up of pneumatic tools, halting production; damage to work by water in paint spray; rusting of metallic shot in blast cleaning equipment. This new Aero After Cooler for compressed air uses the evaporative cooling principle to obtain the lower temperatures and a new design gives greatly increased capacity in compact apparatus. Air, drawn by a fan through a water spray across coils containing the compressed air, is the cooling medium and temperatures within 10° of the wet bulb air temperature can be maintained. The equipment is also applied to gases generated for industrial use. Four-page leaflet describes this equipment.



Mention R310 When Writing or Using Reader Service

IDENTOMETER

Dravo Corp., Machinery Div.
300 Penn Ave., Pittsburgh, Pa.

Increasing use is being made of the "Identometer" to identify steel either in the form in which it arrives from the mill or in the finished product. This is an electrical instrument for identifying instantly and accurately, by the use of reference specimens, any ferrous alloy.

A known sample is affixed to one of two clamps, and the unknown specimen to the other. When the two pieces of metal are brought into contact, the lighted indicator registers on an easily read scale whether or not the two are of the same chemical analysis. The machine is about the size of a small cabinet radio and can be used in laboratories or in shops, warehouses, freight cars, etc. Extreme simplicity of operation makes it adaptable for use by personnel without exceptional skill. Within a very short time, any inexperienced person can learn to operate the Identometer.

Provided with a reference specimen, it is possible by use of this instrument to classify "unknown pieces" or lots of steel according to: (a) Heats (identical analysis); (b) grades (similar analysis); (c) types (dissimilar analysis); (d) heat treatments (identical analysis with dissimilar structure); (e) composite types (two and three plies, clad metals, shear knife, etc.) The instrument can be used to identify metals in any stage of their working from the ingot onward if cooled to room temperature. Complete descriptive literature is available.

Mention R311 When Writing or Using Reader Service

A.S.M. Review of Current Metal Literature — *Continued*

23. INDUSTRIAL USES AND APPLICATIONS

23-139. Special Welding and Machining Fixtures Used on 99-Mm. Anti-Aircraft Gun Mounts. J. R. Miller. *American Machinist*, v. 88, April 27, '44, pp. 117-124.
Breakdown of major assemblies into small components and the preparation of complete work instruction cards simplifies production of gun carriages.

23-140. Materials and Equipment for Stores. George Schwartz. *Architectural Record*, v. 95, April '44, pp. 106-108.
Practical suggestions from operating and maintenance experience of a chain store consultant.

23-141. Production of Stainless Steel Exhaust Manifolds at Buhl Stamping Company. W. N. Robinson. *Steel Processing*, v. 30, April '44, pp. 213-216.
Stampings produced on hard dies; cleaning and drying operations; welding; sand blasting and inspection.

23-142. Self-Sharpening Machine Knives. *Oxy-Acetylene Tips*, v. 23, April '44, p. 59.
Self-sharpening mill knives can be made inexpensively from steel plate by any well-equipped welding or machine shop, through the use of Stellite cobalt-chromium-tungsten hard-facing rod.

23-143. Light Alloys in Metal Rectifiers. *Light Metals*, v. 7, April '44, pp. 162-172.
The theory and practice of the use of aluminum and magnesium in metal rectifiers.

23-144. Sports Equipment Offers Big Chances for Light Metals. *Light Metals*, v. 7, April '44, pp. 179-206.
Fishing tackle and accessories, and equipment for various athletic pastimes.

23-145. The Production of the Sten Gun. *Machinery* (London), v. 64, March 16, '44, pp. 281-285.
Methods employed at a Royal Ordnance Factory.

23-146. Diesel Engines in Wartime Navy. Lisle F. Small. Society of Automotive Engineers *Journal*, v. 52, May '44, pp. 198-201, 224.
Direct coupling of the propeller shaft with the engine versus the indirect drive; welded steel construction; torsional vibration of shafting; spare parts; and gas turbines.

23-147. Building Superchargers at General Electric Ft. Wayne Plant. Howard-Campbell. *Modern Machine Shop*, v. 16, May '44, pp. 124-132, 134.
Principal manufacturing operations on the airplane engine turbosupercharger.

23-148. Used Ball Bearings Perform Vital War Duty. Roger W. Bolz. *Modern Machine Shop*, v. 16, May '44, pp. 206, 208.
Procedures for cleaning, handling and housings.

23-149. Short Circuit Welding Licks Difficult Lubricating Job in Assembling Droppable Fuel Tanks. G. Eldridge Stedman. *Steel*, v. 114, May 8, '44, pp. 100-101, 158-161.
Auxiliary droppable fuel tanks of 24-gage terne plate, lead-coated steel. The deepest draw is 10.75 in.; it has an elliptical and tear-drop shape, so it is produced in two half-shells which are seam welded to form the complete droppable tank.

23-150. Developments in Car Equipment for Streamline Trains. *Railway Age*, v. 116, April 22, '44, pp. 770-775.
Use of new materials and spectacular innovations in the design of modern light-weight cars.

23-151. Weighed in the Balance. K. H. Booty. *Die Casting*, v. 2, May '44, pp. 19-20, 22-24.
With comparatively low rate of production, as compared with other industries, Central Scientific Co., manufacturers of laboratory scales and apparatus, finds other attributes of die castings to be so valuable in solving design problems they far outweigh the disadvantage of low production rates.

23-152. Cleaner Die Castings. George H. Scott. *Die Casting*, v. 2, May '44, opposite p. 24, 3 pp.
Top executive of a vacuum cleaner plant has gone from postwar planning to postwar action; and sees die castings in a role of growing importance.

STEP INTO TOMORROW
WITH YOUR WEIGHING
YESTERDAY
The beam scale was popular...but slow, tedious, cumbersome!
TODAY
Modern dial scales...accurate and rapid... but still do not eliminate costly human errors in reading and recording.
TOMORROW
PRINTED Weight Records will be the accepted practice. The Toledo Printweigh, now serving in hundreds of war plants, will give you new accuracy in your weight-control. Toledo Scale Co., Toledo, Ohio
TOLEDO
PRINTWEIGH
SCALES
Mention R312 When Writing or Using Reader Service

23-153. Beryllium-Copper Springs. Sheldon C. Klock. *Electronic Industries*, v. 3, May '44, pp. 108-109, 282, 284, 285.
Production control methods necessary in applications of beryllium-copper in electric equipment.

23-154. The Production of High-Speed Helical Gears, with Special Reference to the Elimination of Transmission Noises. S. A. Couling. *Institution of Mechanical Engineers*, v. 150, March '44, pp. 172-177.
Experience gained in the production of quiet-running high-speed helical gears; sources of gear noise, and the early attempts at their elimination. Hobbing machines with the indexing wormwheel and table solid are advocated, as opposed to machines having the "creep" mechanism.

23-155. Standardization of Steel Tubing Sizes for Aircraft. John W. Offutt and David T. Marvel. *Aero Digest*, v. 45, April 15, '44, pp. 92, 218.
Strength-weight factor is the dominant consideration in the choice of material for use in airplanes. Airplane designer must hold the dead weight of the plane to the irreducible minimum, calculate the stresses of each member accurately and then select materials and part sizes that will safely withstand these stresses.

23-156. Aircraft Requirements of Steel Castings. V. N. Krivobok. *Metal Progress*, v. 45, May '44, pp. 889-891.
About one-third the weight of a modern fighter's fuselage is steel, and castings comprise a substantial fraction of this. Principal requirements, and the "cast-versus forging" problem.

23-157. Streamlined Production. *Tool Engineer*, v. 13, May '44, pp. 74-82.
Tooling up for 3000 jobs a month; ingenious use of special and standard machines results in efficient high production; well-designed jigs aid mass production; grinding hydraulic piston rods; hand miller with indexing fixture; brazing lowers costs; "in-line" production on burring jobs; pneumatic controls on machine and clamp actuation; crimping tube fittings onto hose ends; handling materials for anodizing.

23-158. Bearing Design Simplified by Use of Clearance Ratios. L. M. Tichvinsky. *Product Engineering*, v. 15, May '44, pp. 323-326.
Bearing clearance data for various types of rotating machinery. Lower and upper clearance limits are indicated with their effect on the journal bearing performance involving the coefficient of friction and minimum oil film thickness. Also a method for measuring the bearing clearance. 5 ref.

23-159. Power Trains for Medium Tanks. Lloyd Lenox. *Modern Industrial Press*, v. 6, May '44, pp. 18, 22.
Adoption of normal automotive manufacturing facilities and techniques to the building of war machines which, although vastly bigger in scale, required the utmost precision in machining and assembly. Numerous examples of this facility are found in the tank and aircraft programs.

23-160. International Unification of Bearings. H. Tornebohm. *Industrial Standardization*, April '44, pp. 63-66.
History of national bodies developing bearing standards; international conferences; boundary dimensions of ball and roller bearings; tolerances of thrust bearings; future needs.

23-161. Improved Explosive Rivet. *Iron Age*, v. 153, May 18, '44, p. 65.
Explosive rivet that fits itself to the hole. Present application for military aircraft; eventually it is expected to have many postwar uses in the fabrication of such products as radios, refrigerators, etc.

23-162. Studebaker Production of 2½-Ton Military Trucks. Joseph Geschelin. *Automotive Industries*, v. 90, May 15, '44, pp. 26-28, 82, 86.
Built to Government specifications, the Studebaker military trucks have incorporated in them standard and interchangeable components. The production lines perform essentially assembly functions. Studebaker is unique in producing its own leaf springs. Mass production character of the operation has made it feasible to utilize assembly conveyors.

23-163. Automatic Control, Centralized Distribution Solve Rivet Troubles. C. O. Davis. *Automotive Industries*, v. 90, May 15, '44, pp. 30-32, 112, 114.
The procurement, handling, storage, distribution and conservation of both DD (icebox) and AD rivets; establishment of entirely new procedures for rivet handling based on a centralized storage; packaging and distribution area.

23-164. What's the Future of the Gas Turbine? F. K. Fischer and C. A. Meyer. *Machine Design*, v. 16, May '44, pp. 99-100.
The future application of the gas turbine depends upon developments in the field of metallurgy, aerodynamics, combustion and heat exchange.

23-165. Gauging the Tooth Thickness of Helical Gears. A. Ryding. *Machinery* (London), v. 64, April 6, '44, pp. 371-373.
Mathematical determination of dimension M for a helical gear.

23-166. Development and Application of Military and Special Steels for Ordnance Purposes. Col. John H. Frye. American Iron and Steel Institute Advance Paper, May 25, '44, 21 pp.
Distribution of steel to Army and civilian uses. Survey of production of ordnance items and accomplishments of various branches of the Ordnance Department in new products and processes, conservation of scarce metals, handling methods and shipping containers.

24. DESIGN

24-24. Designing Tool Equipment to Facilitate Production by Contracting Tool Rooms. E. Boneham. *Machinery*, v. 64, March 23, '44, pp. 315-317.
Delays often due to print being illegible, poor drawing equipment, dimensions in metric measure.

24-25. Theory and Experiment Applied to Journal Bearing Design. H. W. Swift. *Engineers' Digest*, v. 1, April '44, pp. 294-295.
Essential data required are the relationships connecting film thickness and friction with the constructional and impressed conditions.

24-26. Design Rules, III. Herbert Chase. *Die Casting*, v. 2, May '44, pp. 40-45.
Hold over-all dimensions to the minimum; avoid needlessly complex pieces; minimize flash removal costs.

24-27. Cemented Assemblies—Their Place in Design. John Delmonte. *Machine Design*, v. 16, May '44, pp. 79-82.
Cemented assemblies vs. riveted or welded construction. Saves parts and weight; cuts costs; high-frequency heating may be used.

24-28. Curtailing Thermal Expansion in Design. Frederick C. Victory. *Machine Design*, v. 16, May '44, pp. 109-110.
Three possible solutions to this indirect result of thermal expansion.

25. MISCELLANEOUS

25-105. Plant Distribution Systems for Oxygen and Acetylene. Herman Ullmer. *Iron and Steel Engineer*, v. 21, April '44, pp. 40-48.
So widely has the use of oxygen and acetylene been adopted in the production of iron and steel that practically every plant has gone to distribution systems serving large, permanent consumptions from central points.

25-106. Pressure on Tool Builders Growing. J. C. Sullivan. *Steel*, v. 114, May 1, '44, pp. 66-67.
Industry seeks to meet delivery schedules facing increasingly acute manpower shortage with unexpected resurgence in demand developing. Situation complicated by extensive subcontracting on other types of war production.

25-107. What's Ahead for the Metalworking Industry? *Steel*, v. 114, May 1, '44, pp. 73-76.
Disposal of government-owned plants and facilities to present troublesome problem in some sectors of the metalworking industry though percentagewise few companies will be affected. Expectations high for continued extensive subcontracting after the war.

25-108. Self-Limiting Hoist Drive Developed. *Iron Age*, v. 153, May 4, '44, page 51.
New electric hoist drive for cranes, the important feature of which is an exciter embodying a cross-flux principle.

25-109. Template Reproduction Methods. Thomas Miles. *Iron Age*, v. 153, May 4, '44, pp. 52-55.
Numerous methods of transferring engineering information onto tooling and fabrication materials are being used by aircraft manufacturers. Methods now in use reviewed, and recommendations based upon the ability of any process to fulfill a particular requirement.

25-110. Broken Taps Disintegrated Electrically. Stanley H. Brams. *Iron Age*, v. 153, May 4, '44, pp. 60-61.
Removal of broken tools from work in which they have become lodged has always been a problem. Newest method of such recovery is by electric disintegration of the core of the tool, permitting easy withdrawal of the residual outer segments.

25-111. Primary-Exposure X-ray Method for Reproducing Templates. Thomas Miles. *Product Engineering*, v. 15, March '44, pp. 190-193.
Advantages and limitations of the primary-exposure method of template reproduction, one of the two X-ray methods now in use. Procedures for preparing layouts and metal negatives are given in full, as well as details of the reproduction process.

25-112. Steps Up Production 12-Fold on Many Items. G. W. Birdsall. *Steel*, v. 114, May 8, '44, pp. 102-104, 152, 154, 156.
Relatively small plant making highly specialized equipment employs many shortcuts that increase output to meet unprecedented demands. Redesigns take care of material shortages, permit use of faster production methods.

25-113. Fork Truck-Tractor Train Combination Works Well in Handling Steel Sheets. *Steel*, v. 114, May 8, '44, pp. 117-118.
Solar-Sturges has found that a combination of fork trucks and tractor trains provides a flexible arrangement for handling incoming material and keeping it flowing at the correct rate to the stamping presses.

25-114. Centralized Soluble-Oil System Pays for Itself in Two Months. *American Machinist*, v. 88, April 27, '44, p. 97.
Installation cost of the centralized soluble-oil mixing and pumping equipment was $700; in reduction of maintenance labor alone, this sum was saved in two months.

25-115. Metallurgical Research. *Canadian Metals and Metallurgical Industries*, v. 7, April '44, pp. 22-29.
Excellent facilities provided by new laboratories at Bureau of Mines, Ottawa.

25-116. Balancing Rotating Parts. John E. Hyler. *Modern Machine Shop*, v. 16, May '44, pp. 160-162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192.
Methods, technique, and equipment employed in the balancing of rotating parts for smooth running at high speeds.

25-117. Research for Aeronautics—Its Planning and Application. W. S. Farren. *Journal of the Aeronautical Sciences*, v. 11, April '44, pp. 95-109.
The aim of research; the independent worker in research; research on a large scale; a survey of 25 years' achievement; drag reduction; weighty analysis; structural developments; stability and control; power plant developments. Summary—the task of research; problems of the immediate future; the management of research for aeronautics.

25-118. Progress in Aluminum Therapy. W. D. Robson. *The Canadian Institute of Mining and Metallurgy*, No. 384, April '44, pp. 172-179.
Harmlessness of aluminum; proposal to treat human silicosis; selection of individuals for treatment; examination of subjects; apparatus used to provide aluminum; characteristics of aluminum; treatment; results of treatments; conclusions regarding aluminum; aluminum and tuberculosis; field for aluminum therapy; research in the United States; application of aluminum therapy; control of aluminum therapy.

Metal Literature Review—*Continued*

25. MISCELLANEOUS (*cont.*)

25-119. **Aluminium Therapy in the United States.** J. W. G. Hannon, *The Canadian Institute of Mining and Metallurgy*, No. 384, April '44, pp. 180-184.
Exposure; pathology; symptoms; methods of treatment; results of the treatments; further studies.

25-120. **The Engineering Aspects of Aluminum Prophylaxis.** A. W. Jacob. *The Canadian Institute of Mining and Metallurgy*, No. 384, April '44, pp. 185-202.
Apparatus used in the development of aluminum prophylaxis sampling; dispersing; powder used in prophylactic treatment; properties of the powder; concentrations used in silicosis prevention; application of aluminum prophylaxis; pressure necessary for dispersal; installation and operation of blowers; facilities for aluminum prophylaxis at McIntyre; the attitude of the workmen to aluminum prophylaxis; aluminum prophylaxis and ventilation.

25-121. **Dynamiting Frozen Drill Ends.** Nels Sorenson. *Metal Progress*, v. 45, May '44, p. 904.
Salvaging crankshafts by blasting broken drills loose with dynamite.

25-122. **Production Planning.** *Steel*, v. 114, May 15, '44, pp. 90-91, 103, 106.
Setup in Curtiss-Wright's St. Louis plant provides suggestions for engineers facing tough production assignments.

25-123. **Modern Lubrication.** E. M. Barber; Albert G. Ingalls. *Scientific American*, v. 170, May '44, pp. 211-213.
When a true understanding of the basics of the lubrication process was reached bearings and lubricants could be designed to make possible today's machines.

25-124. **Lithographic and Electrolytic Reproduction of Templates.** Thomas Miles. *Product Engineering*, v. 15, May '44, pp. 327-328.
Dry-offset printing, general lithographic methods, Robinson litho method, electrolytic reproduction.

25-125. **Getting and Keeping Technical Talent Today and in 40-X.** *Modern Industry*, v. 7, May 15, '44, pp. 42-46.
Management has tough problem in shortage of engineers, chemists, technicians, and other professionals. Some sound solutions, and warning of postwar headaches.

25-126. **Industry's Postwar Pathfinder — Market Research.** *Modern Industry*, v. 7, May 15, '44, pp. 48-50, 52, 54, 56, 58, 60, 62.
More and more companies are using it in the search for new opportunities in products and markets.

25-127. **Safety Color Code for Industry.** *Iron Age*, v. 153, May 18, '44, p. 83.
Uniform system of color signals for industry proposed by the finishes division of E. I. du Pont de Nemours & Co.

25-128. **Industrial Study Analyzes Postwar Manufacturing Opportunities.** *Western Metals*, v. 2, May '44, p. 30.
Rapid wartime industrialization of the West. New field of opportunities for development of machinery production by Los Angeles chamber of commerce.

25-129. **Construction of the Fontana Plant of the Kaiser Co., Inc. Iron and Steel Division.** George Havas. *Blast Furnace & Steel Plant*, v. 32, May '44, pp. 551-556.
Plant construction and equipment.

25-130. **Tooling Dock Speeds Airframe Fixture Assembly.** John Haydock. *American Machinist*, v. 88, May 25, '44, pp. 91-102.
What the airplane has done for transportation, the tooling dock has paralleled in the field of assembly tooling. Each has made three new advances: increased speed, greater precision and the mastery of the third dimension.

25-131. **The Steel Industry's Place in Safety.** William A. Irvin. American Iron and Steel Institute Advance Paper, May 25, '44, 7 pp.
Program of intelligently planned and consistently executed safety measures sponsored by the steel industry during the past two years.

26. STATISTICS

26-54. **Shall Our Mineral Controls Be Continued After the War?** George B. Langford. *Mining and Metallurgy*, v. 25, May '44, pp. 249-250.
How to conduct the mineral industries of the peace-seeking nations to the fullest advantage of both producers and consumers. The time is past for complete freedom of enterprise with no over-all planning and with unbridled competition.

26-55. **Current Zinc Outlook.** Myron L. Trilsch. *The Mines Magazine*, v. 34, March '44, pp. 116-117.
Review of 1942 and 1943, and 1944 outlook.

26-56. **Restrictive Allocation Relaxed as Tungsten Production Goes Over the Top.** *The Mining Journal*, v. 27, April 30, '44, pp. 3-4.
Alleviation of the tungsten situation since the attack on Pearl Harbor is another of those production miracles which has characterized the nation's war effort and reflects great credit on the resourcefulness of America.

26-57. **Problems of Wartime Metal Output Overcome Largely Through Ingenuity of Metallurgists.** Clyde Williams. *Metals*, v. 14, April '44, pp. 6-8.
In two years we have done a better job of production, substitution and conservation than Germans in 10 years.

26-58. **Immediate Post-War Zinc Outlook Not Disturbing if Adequate Stockpiling Legislation Is Enacted.** R. A. Young. *Metals*, v. 14, April '44, pp. 12-15, 21.
Present government policy of reducing import duties on metal makes long-range prospects for industry less encouraging.

26-59. **Zinc Requirements for Current Year Placed at 920,467 Tons; New Supply at 1,066,907 Tons.** M. L. Trilsch. *Metals*, v. 14, April '44, pp. 16-17.
Indicated surplus of 146,440 tons plus surplus stockpile of 155,839 tons would create reserve of 302,279 tons at close of 1944.

26-60. **Lead Carries Its Weight.** Fred P. Peters. *Scientific American*, v. 170, June '44, pp. 250-252.
Some of lead's recent advances and a hint of its post-war prospects.

27. NEW BOOKS

27-42. **Infrared Spectroscopy.** R. Bowling Barnes, Robert C. Gore, Urner Liddel and Van Zandt Williams. 236 pp., illus., Reinhold Publishing Co., 330 W. 42nd St., New York 18, N. Y. $2.25.
Industrial applications and a bibliography of infrared spectroscopy.

27-43. **Plastics for Industrial Use.** John Sasso. 229 pp., illus., McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. $2.50.
An engineering handbook of materials and methods.

27-44. **Classified Directory.** Eighth Edition, Association of Consulting Chemists and Chemical Engineers, Inc., 50 East 41st St., New York 17, N. Y. Free.
Classification of Consultants. Lists addresses, staffs, scope and activities.

27-45. **The Standardization of Volumetric Solutions.** R. B. Bradstreet. Second Edition, revised and enlarged. Chemical Publishing Co., Inc., 26 Court St., Dept. MC, Brooklyn 2, N. Y. $3.75.
A reference book for analytical chemists and laboratory technicians. Most modern methods of standardization; equations, tables of pertinent data.

27-46. **Essentials of Precision Inspection.** Wesley Mollard. 207 pp., illus., McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. $3.00.
Inspection tools and gages; rules; micrometer calipers; vernier gages; checking holes; knurling, carburizing, sandblasting; gage blocks and attachments; sine bar; milling cutters, key slot; threads; problems; gears.

27-47. **Conservation in the United States.** Axel Ferdinand Gustafson and others. 2nd ed., 488 pp., illus. Comstock Publishing Co., Ithaca, New York. $4.00.
This new edition stresses the fact that now, in wartime, there is an especial need to conserve the nation's natural resources.

27-48. **Die Differential und Integralgleichungen der Mechanik und Physik.** Philipp Frank and Richard v. Mises. 2 v., 2nd ed., 2020 pp., illus. Mary S. Rosenberg, 235 W. 108th St., New York 25. $27.50.

27-49. **Measurements in Electrical Engineering.** Roland Bartel Marshall. 2 v. 190 pp. and 165 pp., illus. John S. Swift Co., Cincinnati, Ohio. $3.00 ea.

27-50. **Pocket Manual of Arc Welding; Data and Information for the Arc Welding Operator and Supervisor.** Clayton B. Herrick. 128 pp., illus. Industrial Publishing Co., Caxton Bldg., Cleveland, Ohio. $0.50.

27-51. **Pictorial Guide to Machine Shop Practice.** H. Grisbrook and C. Phillipson. 91 pp., illus. Emerson Books, New York. $1.50.
A manual of machine shop fundamentals, illustrated with drawings of the right and wrong ways of using tools.

27-52. **Modern Electric and Gas Refrigeration.** Andrew Daniel Althouse and Carl H. Turnquist. 4th ed., 858 pp., illus. Goodheart-Wilcox Co., Chicago. $5.00.

27-53. **Mill and Factory Book of Tool Care.** Carl C. Harrington. 243 pp., illus. Duell, Sloan & Pearce, New York. $1.00.

27-54. **Elementary Principles of Diesel-Engine Construction.** By members of teaching staff, Mechanics' Institute and Boys' Technical High School. Rev. ed., 149 pp., illus. Bruce, Milwaukee, $2.00.
A revision, bringing the technical material and illustrations up to present design and practices.

27-55. **Conveyors and Related Equipment.** Wilbur G. Hudson. 346 pp., illus. John Wiley & Sons, Inc., New York. $5.00.
A general description of elevators, conveyors, hoists, crushers and other methods of material handling for student engineers, architects and plant engineers.

27-56. **Control of Electric Motors.** Paisley Beach Harwood. 2nd ed., 486 pp., illus. John Wiley & Sons, Inc., New York. $5.00.
The text and illustrations have been revised, the arrangement radically changed, some new tables included, and chapters on synchronous motor control and variable-voltage control added.

27-57. **Basic Airplane Mechanics.** Hubert G. Lesley. 411 pp., illus. John Wiley and Sons, Inc., New York. $2.50.
A simple explanation of the theory of airplane construction, and directions for repair and maintenance of airplane parts.

27-58. **Aircraft Mechanic's Pocket Manual.** Joseph A. Ashkouti. 3rd rev. ed.; latest AN parts. Pitman Publishing Co., New York. $1.50.
New sections include stress fundamentals for structural repairs and processes for fabrication of plastic materials.

CALENDAR OF FUTURE MEETINGS

June 19-22—American Society of Mechanical Engineers. Semi-Annual Meeting, William Penn Hotel, Pittsburgh.

June 26-30—American Society for Testing Materials. Annual Meeting, Waldorf-Astoria Hotel, New York City.

June 28-29—Society of Automotive Engineers. National Diesel Fuels and Lubricants Meeting, Hotel Knickerbocker, Chicago.

July 12—The Magnesium Association. General Meeting, Palmer House, Chicago, Ill.

Oct. 16-20—National Metal Congress and War Conference Display. Sponsored by American Society for Metals, Hotel Statler and Public Auditorium, Cleveland.

Named Advertising Head for Summerill Affiliates

JOHN P. DODS, director of research and advertising manager for the Summerill Tubing Co., Bridgeport, Pa., has been appointed director of advertising and sales promotion for the closely affiliated interests of the Columbia Steel and Shafting Co., The Edgar T. Ward's Sons Co., and the Summerill Tubing Co.

Silver-Clad Steel Welded Into Columns For Acid Dehydration

Silver and silver-clad steel has solved many vexing corrosion problems in industrial applications, but it has likewise given rise to a variety of fabrication problems, particularly in welding, according to an article in *The Welding Engineer*, May 1944, page 36.

An example of the problems encountered with silver clad is provided by the fabrication of silver-lined hydrofluoric acid dehydration columns for an oil refining process, described in this article by Arthur Schwarz and Walter B. Meyer of John Nooter Boiler Works Co.

The columns were fabricated in sections, made from two sizes of plate 3/8 in. thick and 7/8 in. thick overall. The seams to be welded were vee-beveled on an edging planer before the plates were rolled. After cutting the steel, the silver cladding was removed for a space of 3/32 in. on each edge. The first weld metal was applied from the silver side with coated mild steel electrodes. The opposite side (steel side) of this weld was then chipped away to solid metal, and the steel weld completed with proper reinforcing overlay.

Next the silver side was ground flush with the steel surface below the cladding, thereby presenting a smooth, pit-free surface. To this surface a fine silver bead was applied by means of the atomic hydrogen process. The filler rod used was a bare rod of fine silver (99.9% pure).

Silver melts at 1762° F. and is quite brittle near melting temperatures because of the element's tendency to absorb 22 times its volume of oxygen when melted. On all silver welding it was therefore found advisable to apply a preheat of 1000° F. to the entire section in order to insure slow cooling and to complete the expulsion of the absorbed oxygen.

The continuation of the preheat as welding progressed was also found necessary. The temperature was accurately checked by means of a pyrometer throughout the operation.

The silver welding rod was melted down without the use of flux, to prevent the introduction of impurities into the weld. As soon as the final silver had been deposited the bead was peened while the temperature was maintained between 600 and 650° F.

X-Ray and Magnaflux Symposium Held

Reported by J. E. Hill
Metallurgist, Fairfield Tin Mill,
Tennessee Coal, Iron & R. R. Co.

An X-Ray and Magnaflux Symposium featured the regular meeting of the Birmingham District Chapter on March 21. Ray L. Farabee, formerly head of the Department of Metallurgical Engineering, University of Alabama, at present executive assistant to the vice-president of Central Foundry Co., Bessemer, Ala., was chairman. He was ably assisted by C. E. Betz, vice-president of Magnaflux Corp., of New York, T. A. Parker, X-ray technician for Chicago Bridge & Iron Co., and Eric Rogers, professor of physics, University of Alabama.

The meeting opened with a brief talk by Mr. Farabee in which he pointed out that both X-ray and Magnaflux testing as applied to metal is in its infancy, having seen most of its development since about 1930.

Mr. Betz pointed out that while X-ray can be used to locate deep-seated cracks and inclusions, the primary function of Magnaflux is to locate defects near the surface. In Magnaflux testing the area to be tested is covered either by the wet or the dry method with very fine powder and then, by passing current through the test piece or by placing it in a live coil, the pattern of the powder can be studied to locate any surface defects present. Mr. Betz said that the sensitivity of this test varies widely depending on the application, method, and especially on the technique of the operator.

Mr. Parker was then called on for a brief discussion of the two methods, and said he found Magnaflux very helpful in locating laminations. On heavy welds, castings, and other specimens where both the surface and the heart of the test piece must be examined carefully he uses both methods to advantage.

Dr. Rogers warned the audience that X-ray is very dangerous if not handled properly. Since the intensity varies as the inverse square of the distance, he advised staying as far away from the apparatus as possible when operating it.

The technical session was preceded by the usual fellowship dinner and a U. S. Army Signal Corps movie.

MANUFACTURERS' CATALOGS IN REVIEW

Stellite Star J-Metal

Haynes Stellite Co., Kokomo, Ind.

A new, revised 16-page pamphlet presents sizes and prices of Star J-Metal round tools along with more complete data on standard square, rectangular and tipped tools. In addition, the list of standard milling cutter blades has been extended; information is detailed on tool holders and adaptors that can be made for use with Star J-Metal; and the sizes, prices, and descriptions of Stellite alloy wear strips are included.

Mention R313 When Writing or Using Reader Service

New Buffing Composition Catalog

Frederic B. Stevens, Inc.,
Larned & Third Sts., Detroit 26, Mich.

This new catalog describes the various buffing compositions manufactured and contains numerous articles and charts on modern materials and methods used in polishing, buffing, deburring and cleaning operations. Of wide interest to metal finishers, this 36-page book gives suggestions on cleaning and corrosion problems and a description of the construction and equipment in a modern laboratory devoted to problems much like their own, including ideas which may help when they plan a new laboratory. Completely indexed for reference, the catalog discusses the polishing and buffing of aluminum, methods for determining the thickness of metallic coatings and many other methods and processes.

Mention R314 When Writing or Using Reader Service

"Fasteners"

American Institute of Bolt, Nut and Rivet Manufacturers,
Hanna Bldg., Cleveland, O.

The first 24-page issue of "Fasteners", new publication of this Institute, is packed with factual engineering data on the application and use of headed and threaded products. An article by George S. Case, Chairman of the Board, The Lamson and Sessions Co., discusses the rolled screw thread process and shows how continued improvement in this process, resulting in greater accuracy, has led to its use in precision work. Other articles deal with the cold driving of large rivets, tentative specifications for cold riveted construction, a discussion of standard bolt heads and nuts, and with the question, "How Tight Should a Bolt Be?" Three pages are devoted to a useful digest of current information on bolts, nuts, rivets, screws, etc., as reported in other industrial publications.

Mention R315 When Writing or Using Reader Service

How Large Springs Are Coiled

Muehlhausen Spring Corp.,
1943 Michigan Ave., Logansport, Ind.

A new 5-page folder illustrates and describes how large springs are hot-coiled. Described as the first of its kind, the new leaflet shows facilities necessary and operations required to fabricate these springs in quantity and yet hold to the tolerances demanded by the application of the spring. The folder represents a quick trip through the hot-coiling plant of this company, one of the largest in the world devoted exclusively to hot-forming springs, and highlights the extensive equipment that enables this company to produce the exact type and size spring to meet any application.

Mention R316 When Writing or Using Reader Service

Meehanite—the Metal for Postwar Castings

Meehanite Research Institute of America,
Pershing Square Bldg., New Rochelle, N. Y.

Bulletin No. 18 is an illustrated 4-page folder describing a variety of recent applications of Meehanite castings for highly stressed parts. The leaflet shows how the use of Meehanite improved the production of pressure cylinders of hydraulic presses of the E. W. Bliss Co. and cylinder housings for a rock drill manufactured by Cleveland Rock Drill Co.

Mention R317 When Writing or Using Reader Service

Ovens

Harold E. Trent Co., Leverington Ave. and Wilde St.,
Manayunk, Philadelphia 27, Pa.

This 12-page bulletin (71-T) illustrates the complete line of electrically heated ovens manufactured by this company. Construction features, sizes and applications are given for laboratory ovens, stainless steel laboratory ovens, constant temperature ovens, gravity convection and forced convection ovens, industrial and processing ovens, conveyor and special ovens.

Mention R318 When Writing or Using Reader Service

The Houghton Line

E. F. Houghton & Co.,
303 W. Lehigh Ave., Philadelphia 33, Pa.

One of the most interesting articles in the April-May, 1944 issue of this useful magazine, "The Houghton Line", deals with the Watertown Arensal, noteworthy for two main contributions to the war effort—its development of centrifugal gun tube castings, a little more than twice as fast as the forging method, and its metallurgical laboratory where more than 30,000 tests are made each month. The entire magazine makes good reading,. reflecting as it does the broad service of the company to the metal industry and the practical, down-to-earth philosophy of President A. E. Carpenter, "Near Editor" of the publication.

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Dillon Tensile Tester

W. C. Dillon & Co., Inc.,
5410 W. Harrison St., Chicago 44, Ill.

The new Model K Dillon portable tensile tester is described in this 8-page leaflet. Many types of tests with this instrument are illustrated, with details on compression and transverse testing.

Mention R320 When Writing or Using Reader Service

Sump-Vac Sump Cleaner

Spencer Turbine Co., Hartford 6, Conn.

Attractive new bulletin describes the Spencer Sump-Vac, a new portable vacuum producer which is said to clean machine sump tanks in 2 to 10 min., as compared with half an hour with former methods. Also briefly described are applications of industrial vacuum cleaners and turbo-compressors, in ordinary and special cleaning and as an aid to countless industrial processes.

Mention R321 When Writing or Using Reader Service

Silver Babbitt

National Bearing Metals Corp.,
4930 Manchester Ave., St. Louis 10, Mo.

The development of two grades of recognized lead-base babbitts containing silver, with physical characteristics comparable to those found in tin-base babbitts, is described in this 4-page leaflet. The advantages of this Silver Babbitt are presented along with compression load curves.

Mention R322 When Writing or Using Reader Service

Z-Metal Chain Belts

Chain Belt Co., 1600 W. Bruce St., Milwaukee 4, Wis.

A new 8-page catalog describes Rex Z-Metal chain belts for more economical drive and conveyor service in many industries. Rex Z-Metal is a ductile ferrous cast metal with a high tensile strength (more than 30% stronger than malleable iron) and a correspondingly high yield point. It is said to be an exceptional material for use in cast chain belts because of its strength and toughness, giving it the ability to absorb shock loads and to effectively resist wear under some of the toughest operating conditions. This metal is not stainless but resists corrosive action of many acids and alkalis. This booklet cites properties of the metal and illustrates many styles, types and sizes of chain belts.

Mention R323 When Writing or Using Reader Service

Industrial X-Ray Unit

North American Philips Co., Inc.,
100 E. 42nd St., New York 17, N. Y.

Norelco Searchray 150, a complete, self-contained industrial X-ray unit, is described in this new 4-page folder. Telling how the unit works and listing advantages and applications, the leaflet presents several Searchray 150 photographs to illustrate its use in X-ray examination of aluminum, steel, copper, die castings and other materials and parts.

Mention R324 When Writing or Using Reader Service

Cyanide Zinc and Bright Zinc Plating

Turco Products, Inc.,
6135 S. Central Ave., Los Angeles, Calif.

This is a 10-page technical bulletin prepared by Turco chemists, process engineers and field engineers on cyanide zinc and bright zinc plating with Turco Type X, Turco Porokleen and Turco Penetrol. Included in this comprehensive discussion are several photographs and a flow sheet of the cyanide zinc and bright zinc plating processes for still plating and for barrel plating.

Mention R325 When Writing or Using Reader Service

Red-X Aluminum Alloys

The National Smelting Co.,
6700 Grant Ave., Cleveland 5, Ohio

This is an attractive 16-page, file-folder type booklet on Red-X aluminum alloys produced by this company, the largest single producer of commercial aluminum and magnesium alloys (alloys made from industrial raw materials rather than primary metal). These alloys can be sand cast, chill and die cast, and forged, and made from selected industrial metal under modern, scientific control. "Red-X" was coined from "reduced expansion" because these alloys have lower than average expansion under heat, as in an engine piston. Suffix numbers designate silicon content. The booklet describes heat treatment, aging treatments, and typical properties.

Mention R326 When Writing or Using Reader Service

Carbofrax Refractory Skid Rails

The Carborundum Co., Perth Amboy, N. J.

Skid rails made of "Carbofrax"—the Carborundum Brand silicon carbide refractory—and their use in a wide variety of furnaces are described in this 24-page booklet. "Dry" skids of "Carbofrax" are said to be utilized to replace water-cooled pipes thereby eliminating the cold spots experienced with water cooling. They are also used for the replacement of special heat resisting uncooled alloy skids, usually giving several times the life of the uncooled alloy. Diagrams show application of the skid rails in box and continuous type heating furnaces for slabs, plate, pipe, sheet bars and other mill uses.

Mention R327 When Writing or Using Reader Service

Practical Surface-Roughness Measurement

Physicists Research Co., Dept. 14,
343 S. Main St., Ann Arbor, Mich.

The second edition of "Practical Surface-Roughness Measurement" has just been published by this company, makers of the Profilometer. This completely revised, 12-page booklet contains information on surface roughness and its measurement, and describes the complete line of Profilometer roughness gaging equipment. It lists specifications and prices of all units and accessories. There is a comprehensive discussion of the questions, "What is surface roughness?" and "Why measure it?"

Mention R328 When Writing or Using Reader Service

Beryllium Copper

The Riverside Metal Co., 15 Maiden Lane, New York

This revised 16-page booklet on Riverside beryllium copper has been prompted by the knowledge that there is a real need for up-to-date information based upon improvements in the alloy and developments in applications during recent years. Well indexed, the booklet presents many facts about beryllium including physical constants, applications, heat treatment, properties, fabrication, and cleaning or pickling.

Mention R329 When Writing or Using Reader Service

Gas and Electric Welding Supplies Price List

Air Reduction Sales Co.,
60 East 42nd St., New York 17, N. Y.

This 20-page revised price list covers gas welding rods made in a wide range of metals, types and sizes for all welding requirements. It also describes hard facing alloys, brazing alloys, fluxes, helmets, goggles, gloves, welding cable, and in addition to prices includes detailed information of assistance to buyers. Among the new items described is the Suregrip Rod Saver that effects savings in electrode cost from 7 to 14% because only ⅝ in. of the bare electrode can be inserted in the socket, thus eliminating wasteful overhang. Design of the handle with 28 large openings materially reduces contact with the welders' gloves and minimizes overheating, even when electrodes are burned to a 1-in. stub.

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